Exploratory Exercises

Name _____

Simplify.

1. $(3 - \sqrt{7})(3 + \sqrt{7})$ 2. $(\sqrt{6} - 5)(\sqrt{6} + 5)$ 3. $(4 + 2\sqrt{2})(4 - 2\sqrt{2})$

State a conjugate of each expression. Then multiply the expression by this conjugate.

4. $3 + \sqrt{2}$ 5. $\sqrt{3} + 4$ 6. $7 - \sqrt{5}$

7. $6 + \sqrt{8}$ 8. $9 - \sqrt{3}$ 9. $\sqrt{2} + \sqrt{5}$

10. $\sqrt{3} - \sqrt{7}$ 11. $2\sqrt{5} - \sqrt{6}$ 12. $2\sqrt{8} + 3\sqrt{5}$

State the fraction by which each expression should be multiplied to rationalize the denominator.

13. $\frac{3}{\sqrt{5}}$ 14. $\frac{7}{\sqrt{11}}$ 15. $\frac{3\sqrt{2}}{\sqrt{6}}$ 16. $\frac{2\sqrt{3}}{\sqrt{8}}$

17. $\sqrt{\frac{3}{5}}$ 18. $\sqrt{\frac{8}{7}}$ 19. $\frac{1}{3 + \sqrt{7}}$ 20. $\frac{2\sqrt{5}}{4 - \sqrt{3}}$

Written Exercises

Simplify.

21. $\frac{\sqrt{42}}{\sqrt{6}}$ 22. $\frac{\sqrt{20}}{\sqrt{5}}$ 23. $\frac{\sqrt{10}}{\sqrt{7}}$ 24. $\frac{\sqrt{7}}{\sqrt{3}}$

25. $\frac{\sqrt{6}}{\sqrt{18}}$ 26. $\frac{\sqrt{5}}{\sqrt{10}}$ 27. $\sqrt{\frac{3}{7}}$ 28. $\sqrt{\frac{5}{2}}$

29. $\sqrt{\frac{7}{20}}$ 30. $\sqrt{\frac{11}{32}}$ 31. $\sqrt{\frac{2}{3}} \cdot \sqrt{\frac{5}{2}}$ 32. $\sqrt{\frac{7}{11}} \cdot \sqrt{\frac{10}{7}}$

33. $\sqrt{\frac{4}{7}} \cdot \sqrt{\frac{3}{4}}$ 34. $\sqrt{\frac{1}{6}} \cdot \sqrt{\frac{6}{11}}$ 35. $\sqrt{\frac{a}{3}}$ 36. $\sqrt{\frac{b}{6}}$

37. $\sqrt{\frac{a^2}{5}}$ 38. $\sqrt{\frac{m^4}{11}}$ 39. $\sqrt{\frac{27}{b^2}}$ 40. $\sqrt{\frac{54}{r^2}}$

41. $\sqrt{\frac{5n^5}{4m^5}}$ 42. $\sqrt{\frac{11a^3}{10b^3}}$ 43. $\frac{\sqrt{3a^3b^4}}{\sqrt{8ab^6}}$ 44. $\frac{\sqrt{9x^5y}}{\sqrt{12x^2y^6}}$

45. $\frac{1}{7 - \sqrt{3}}$ 46. $\frac{1}{6 + \sqrt{3}}$ 47. $\frac{11}{\sqrt{2} + 5}$ 48. $\frac{10}{\sqrt{5} - 9}$

49. $\frac{6}{\sqrt{3} + \sqrt{2}}$ 50. $\frac{12}{\sqrt{6} - \sqrt{5}}$ 51. $\frac{10a}{2 - \sqrt{a}}$ 52. $\frac{9b}{6 + \sqrt{b}}$

53. $\frac{2\sqrt{5}}{-3 + \sqrt{6}}$ 54. $\frac{-3\sqrt{5}}{-2 - \sqrt{6}}$ 55. $\frac{-9\sqrt{2}}{-4 + \sqrt{8}}$ 56. $\frac{-10\sqrt{6}}{3 + \sqrt{6}}$

57. $\frac{2\sqrt{7}}{3\sqrt{5} + 5\sqrt{3}}$ 58. $\frac{3\sqrt{11}}{7\sqrt{2} - 6\sqrt{5}}$ 59. $\frac{6\sqrt{5}}{4\sqrt{8} - 2\sqrt{7}}$ 60. $\frac{4\sqrt{19}}{3\sqrt{7} + 4\sqrt{12}}$

Challenge Exercises

Simplify. Assume that the value of each variable is positive.

61. $\frac{5 + 3\sqrt{2}}{4 - 6\sqrt{2}}$ 62. $\frac{3\sqrt{2} - \sqrt{7}}{2\sqrt{3} - 5\sqrt{2}}$ 63. $\frac{\sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b}}$ 64. $\frac{\sqrt{x} + \sqrt{y}}{\sqrt{x} - \sqrt{y}}$