

Simplifying Radicals

1. $\sqrt{225} = 15$

2. $\sqrt{270} = 3\sqrt{30}$

3. $\sqrt[5]{4608} = 2\sqrt[5]{144}$

4. $10\sqrt{112} = 40\sqrt{7}$

5. $3\sqrt[3]{1200} = 6\sqrt[3]{150}$

6. $\sqrt{180} = 6\sqrt{5}$

7. $\sqrt[3]{125x^4y^6} = 5xy^2\sqrt[3]{x}$

8. $\sqrt[5]{100x^4y^{10}} = xy^2\sqrt[5]{100x}$

9. $\sqrt[4]{1296} = 6$

Multiplying Radicals

10. $3\sqrt{20} \cdot \sqrt{10} = \frac{3\sqrt{200}}{30\sqrt{2}}$

11. $5\sqrt{4} \cdot \sqrt{4} = \frac{5\sqrt{16}}{20}$

12. $\sqrt[3]{125x^4y^6} \cdot \sqrt[3]{4x^2y^5} =$

$\sqrt[3]{500x^6y^{11}} = 5x^2y^3\sqrt[3]{4y^2}$

13. $\sqrt[4]{x^2} \cdot \sqrt[4]{x^2} = \sqrt[4]{x^4} = x$

14. $\sqrt[3]{10} \cdot \sqrt[3]{32} = \sqrt[3]{320} = 4\sqrt[3]{5}$

15. $\sqrt[5]{18} \cdot \sqrt[5]{27} = \sqrt[5]{486} = 3\sqrt[5]{2}$

Dividing Radicals

16. $\sqrt{\frac{18}{49}} = \frac{\sqrt{18}}{\sqrt{49}} = \frac{3\sqrt{2}}{7}$

17. $\sqrt{\frac{80}{64}} = \frac{4\sqrt{5}}{8} = \frac{\sqrt{5}}{2}$

18. $\sqrt{\frac{175}{54}} = \frac{5\sqrt{7}}{3\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{5\sqrt{42}}{18}$

19. $\sqrt{\frac{10}{3}} = \frac{\sqrt{10}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{30}}{3}$

20. $\sqrt{\frac{5}{10}} = \frac{\sqrt{5}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{\sqrt{50}}{10} = \frac{5\sqrt{2}}{10} = \frac{\sqrt{2}}{2}$

21. $\sqrt[3]{\frac{54}{125}} = \frac{3\sqrt[3]{2}}{5}$

22. $\sqrt[4]{\frac{5}{8}} = \frac{\sqrt[4]{5}}{\sqrt[4]{8}} \cdot \frac{\sqrt[4]{2}}{\sqrt[4]{2}} = \frac{\sqrt[4]{10}}{2}$

23. $\sqrt[5]{\frac{1}{27}} = \frac{1}{\sqrt[5]{27}} \cdot \frac{\sqrt[5]{3 \cdot 3}}{\sqrt[5]{3 \cdot 3}} = \frac{\sqrt[5]{9}}{3}$

24. $\sqrt[3]{\frac{27}{8}} = \frac{3}{2}$

25. $\sqrt[4]{\frac{6x^7}{y^4}} = \frac{x\sqrt[4]{6x^3}}{y}$

26. $\sqrt[3]{\frac{25x^4}{y^2}} = \frac{x\sqrt[3]{25x}}{\sqrt[3]{y^2}} \cdot \frac{\sqrt[3]{y}}{\sqrt[3]{y}} = \frac{x\sqrt[3]{25xy}}{y}$

27. $\sqrt[5]{\frac{3y^2}{x^4}} = \frac{\sqrt[5]{3y^2}}{\sqrt[5]{x^4}} \cdot \frac{\sqrt[5]{x}}{\sqrt[5]{x}} = \frac{\sqrt[5]{2xy^2}}{x}$

Adding and Subtracting Radicals

28. $10\sqrt{3} + 5\sqrt{3} = 15\sqrt{3}$

29. $4\sqrt{6} - 11\sqrt{6} = -7\sqrt{6}$

30. $\sqrt{3} + \sqrt{3} = 2\sqrt{3}$

31. $\sqrt{4} + \sqrt{5} = 2 + \sqrt{5}$

32. $\sqrt[3]{2} + 3\sqrt[3]{2} = 4\sqrt[3]{2}$

33. $2\sqrt[4]{5} + 6\sqrt[4]{5} = 8\sqrt[4]{5}$

34. $\sqrt[5]{2} - 7\sqrt[5]{2} = \sqrt[5]{2} - 7\sqrt[5]{2}$

35. $\sqrt[4]{x^2} + 3\sqrt[4]{x^2} = 4\sqrt[4]{x^2}$

36. $\sqrt[5]{3x} - 2\sqrt[5]{x} = \sqrt[5]{3x} - 2\sqrt[5]{x}$

Complex Numbers (Multiplying and Dividing)

$$37. (5 + \sqrt{2})(4 - \sqrt{6}) =$$

$$20 - 5\sqrt{6} + 4\sqrt{2} - \sqrt{12}$$

$$20 - 5\sqrt{6} + 4\sqrt{2} - 2\sqrt{3}$$

$$38. (7 - \sqrt{3})(1 - 2\sqrt{5}) =$$

$$7 - 14\sqrt{5} - \sqrt{3} + 2\sqrt{15}$$

$$39. (3 + \sqrt{5})(9 - \sqrt{5}) =$$

$$27 - 3\sqrt{5} + 9\sqrt{5} - 5$$

$$22 + 6\sqrt{5}$$

$$40. \frac{4}{5 + \sqrt{3}} =$$

$$\frac{4}{5 + \sqrt{3}} \cdot \frac{5 - \sqrt{3}}{5 - \sqrt{3}} = \frac{20 - 4\sqrt{3}}{25 + 5\sqrt{3} - 5\sqrt{3} - 3}$$

$$\frac{20 - 4\sqrt{3}}{22} = \frac{10 - 2\sqrt{3}}{11}$$

$$41. \frac{1 - \sqrt{2}}{3 - \sqrt{5}} =$$

$$\frac{1 - \sqrt{2}}{3 - \sqrt{5}} \cdot \frac{3 + \sqrt{5}}{3 + \sqrt{5}} = \frac{3 + \sqrt{5} - 3\sqrt{2} - \sqrt{10}}{9 + 3\sqrt{5} - 3\sqrt{5} - 5}$$

$$\frac{3 + \sqrt{5} - 3\sqrt{2} - \sqrt{10}}{4}$$

$$42. \frac{8 + \sqrt{3}}{5 + \sqrt{6}} =$$

$$\frac{(8 + \sqrt{3})(5 - \sqrt{6})}{(5 + \sqrt{6})(5 - \sqrt{6})} = \frac{40 - 8\sqrt{6} + 5\sqrt{3} - \sqrt{18}}{25 - 5\sqrt{6} + 5\sqrt{6} - 6} = \frac{40 - 8\sqrt{6} + 5\sqrt{3} - 3\sqrt{2}}{19}$$