

Radical Review Worksheet

Simplify.

1. $\sqrt{121} = 11$ 2. $-\sqrt{49} = -7$ 3. $\sqrt{\frac{25}{36}} = \frac{5}{6}$ 4. $\sqrt{0.0064} = 0.04$ 5. $\sqrt{1} = 1$ 6. $\sqrt{(-15)^2} = 15$

7. $\sqrt{(2x)^2} = 2|x|$ 8. $\sqrt{16w^4} = 4w^2$ 9. $\sqrt{(y-3)^2} = |y-3|$ 10. $\sqrt{4x^2 - 20x + 25} = \sqrt{(2x-5)^2} = |2x-5|$

11. $\sqrt[3]{1} = 1$ 12. $\sqrt[3]{-64} = -4$ 13. $\sqrt[3]{27m^3} = 3m$ 14. $\sqrt[3]{-8h^6} = -2h^2$ 15. $\sqrt[5]{-243} = -3$ 16. $\sqrt[4]{256} = 4$

17. $-\sqrt[4]{256} = -4$ 18. $\sqrt[4]{-256} = \emptyset$

Multiply and simplify.

19. $\sqrt{19} \cdot \sqrt{5} = \sqrt{95}$ 20. $\sqrt[3]{4} \cdot \sqrt[3]{6} = \sqrt[3]{24} = \sqrt[3]{8} \cdot \sqrt[3]{3} = 2\sqrt[3]{3}$ 21. $\sqrt{5x^4} \cdot \sqrt{4x^2} = \sqrt{20x^6} = \sqrt{4x^6} \cdot \sqrt{5} = 2|x^3|\sqrt{5}$

Simplify.

22. $\sqrt{18} = \sqrt{9} \cdot \sqrt{2} = 3\sqrt{2}$ 23. $\sqrt[3]{160} = \sqrt[3]{8} \cdot \sqrt[3]{20} = 2\sqrt[3]{20}$ 24. $\sqrt{300} = \sqrt{100} \cdot \sqrt{3} = 10\sqrt{3}$

25. $\sqrt[3]{40} = \sqrt[3]{8} \cdot \sqrt[3]{5} = 2\sqrt[3]{5}$ 26. $\sqrt{12a^5b^8} = \sqrt{4a^4b^8} \cdot \sqrt{3a} = 2a^2b^4\sqrt{3a}$

Divide and simplify.

27. $\sqrt{\frac{36}{x^2}} = \frac{6}{|x|}$ 28. $\frac{\sqrt{300}}{\sqrt{3}} = \sqrt{100} = 10$ 29. $\frac{5\sqrt[3]{3}}{\sqrt[3]{81}} = \frac{5}{\sqrt[3]{27}} = \frac{5}{3}$ 30. $\frac{\sqrt[5]{64x^2y^6}}{\sqrt[5]{2x^7y}} = \sqrt[5]{\frac{32y^5}{x^5}} = \frac{2y}{x}$

Add or subtract. Simplify.

31. $3\sqrt{5} + 4\sqrt{5} = 7\sqrt{5}$ 32. $6\sqrt{2} - 3\sqrt{2} = 3\sqrt{2}$

33. $4\sqrt{8} + 3\sqrt{2} = 4 \cdot \sqrt{4} \cdot \sqrt{2} + 3\sqrt{2} = 4 \cdot 2 \cdot \sqrt{2} + 3\sqrt{2} = 8\sqrt{2} + 3\sqrt{2} = 11\sqrt{2}$ 34. $5\sqrt[3]{2} - 6\sqrt{3} + 4\sqrt[3]{2} = 9\sqrt[3]{2} - 6\sqrt{3}$

35. $\sqrt{25x-50} - \sqrt{4x-8} = \sqrt{25(x-2)} - \sqrt{4(x-2)} = \sqrt{25}\sqrt{x-2} - \sqrt{4}\sqrt{x-2} = 5\sqrt{x-2} - 2\sqrt{x-2} = 3\sqrt{x-2}$

Multiply. Simplify.

36. $\sqrt{3}(5\sqrt{4} + 2\sqrt{7}) = \sqrt{3}(10 + 2\sqrt{7}) = 10\sqrt{3} + 2\sqrt{21}$

37. $\sqrt[3]{8}(2\sqrt[3]{2} - 4\sqrt[3]{3}) = 2(2\sqrt[3]{2} - 4\sqrt[3]{3}) = 4\sqrt[3]{2} - 8\sqrt[3]{3}$

38. $(\sqrt{x} - 3)(2\sqrt{x} + 4) = 2|x| + 4\sqrt{x} - 6\sqrt{x} - 12 = 2|x| - 2\sqrt{x} - 12$ 39. $(7 - 2\sqrt{x})(7 + 2\sqrt{x}) = 49 - 4|x|$

40. $(3\sqrt{y} - 4)^2 = 9|y| - 24\sqrt{y} + 16$

Write without rational exponents.

41. $3^{1/2} = \sqrt{3}$ 42. $x^{3/5} = \sqrt[5]{x^3}$ 43. $(2y)^{2/3} = \sqrt[3]{(2y)^2} = \sqrt[3]{4y^2}$ 44. $27^{1/3} = \sqrt[3]{27} = 3$

Write with rational exponents.

45. $\sqrt{a^3 x^2 y} = (a^3 x^2 y)^{1/2}$ 46. $\sqrt[3]{16a^2 b^5} = (16a^2 b^5)^{1/3}$ 47. $(\sqrt[3]{5ab^2 c})^4 = (5ab^2 c)^{4/3}$

Use the properties of exponents to simplify.

48. $5^{1/3} \cdot 5^{4/5} = 5^{5/15} \cdot 5^{12/15} = 5^{17/15}$ 49. $\frac{2^{1/6}}{2^{3/6}} = 2^{-2/6} = 2^{-1/3} = \frac{1}{2^{1/3}}$

Use rational exponents to simplify.

50. $\sqrt[6]{a^3} = a^{3/6} = a^{1/2} = \sqrt{a}$ 51. $\sqrt[8]{4} = 2^{2/8} = 2^{1/4} = \sqrt[4]{2}$ 52. $\sqrt[9]{27} = 3^{3/9} = 3^{1/3} = \sqrt[3]{3}$

53. $\sqrt[3]{64x^6 y^{12}} = 2^{6/3} x^{6/3} y^{12/3} = 2^2 x^2 y^4 = 4x^2 y^4$

Write as a single radical expression.

54. $\sqrt[4]{5} \cdot \sqrt{2} = 5^{1/4} \cdot 2^{1/2} = 5^{1/4} \cdot 2^{2/4} = (5 \cdot 2^2)^{1/4} = 20^{1/4} = \sqrt[4]{20}$

55. $\sqrt[3]{2x} \cdot \sqrt[4]{4x^2} = (2x)^{1/3} \cdot (4x^2)^{1/4} = 2^{1/3} x^{1/3} \cdot 2^{2/4} x^{2/4} = 2^{1/3} x^{1/3} \cdot 2^{1/2} x^{1/2} = 2^{2/6} x^{2/6} \cdot 2^{3/6} x^{3/6} = \sqrt[6]{2^2 x^2 \cdot 2^3 x^3} = \sqrt[6]{32x^5}$

56. $\frac{\sqrt{(2x+y)^7}}{\sqrt[3]{2x+y}} = \frac{(2x+y)^{7/2}}{(2x+y)^{1/3}} = \frac{(2x+y)^{21/6}}{(2x+y)^{2/6}} = (2x+y)^{19/6} = \sqrt[6]{(2x+y)^{19}}$ 57. $a^{1/2} b^{3/5} c^{-1/5} = a^{15/30} b^{20/30} c^{-6/30} = \sqrt[30]{a^{15} b^{20} c^{-6}}$

58. $\frac{x^{3/5} y^{1/4}}{x^{-2/5} y^{4/3}} = \frac{x^{5/5} y^{3/12}}{y^{16/12}} = \frac{x^{12/12}}{y^{13/12}} = \sqrt[12]{\frac{x^{12}}{y^{13}}}$

59. $\frac{(4w^3 h^{2/5})^2}{-3w^{1/2} h^2} = -\frac{16w^6 h^{4/5}}{3w^{1/2} h^2} = -\frac{16w^{12/2} h^{4/5}}{3w^{1/2} h^{10/5}} = -\frac{16w^{11/2}}{3h^{6/5}} = -\frac{16w^{55/10}}{3h^{12/10}} = -\frac{16}{3} \sqrt[10]{\frac{w^{55}}{h^{12}}}$

Write as a single radical expression.

60. $(\sqrt[4]{3} \cdot \sqrt{2} + 2\sqrt[4]{192})^2 = (3^{1/4} \cdot 2^{1/2} + 2\sqrt[4]{16 \cdot 12})^2$
 $= (3^{1/4} \cdot 2^{3/4} + 4\sqrt[4]{12})^2 = (\sqrt[4]{12} + 4\sqrt[4]{12})^2 = (5\sqrt[4]{12})^2$
 $= (5 \cdot 12^{1/4})^2 = 25 \cdot 12^{1/2} = 25\sqrt{12} = 25\sqrt{4 \cdot 3} = 50\sqrt{3}$