

Radical Expressions

2010 S Otts

(adapted from Radical Expressions Lessons, A. Williams)

Perform the following tasks:

A. Find the real number solution set for each of the following:

1. $x^2 = 25$

2. $x^2 = 81$

3. $x^2 = 10,000$

4. $x^2 = 36$

5. $x^2 = 1$

B. Find the cube root of each number:

6. 27

7. 64

8. -125

9. 8

10. 1000

C. Use a calculator to find each of the following roots, IF they are real numbers, to the nearest ten-thousandth (4 decimal places):

11. $\sqrt{45}$

12. $\sqrt[3]{637}$

13. $\sqrt[5]{9827}$

14. $\sqrt{1900}$

15. $\sqrt[3]{87}$

16. $\sqrt{-67}$

17. $\sqrt[3]{-67}$

D. Simplify. Use calculator to check:

18. $\sqrt{36}$

19. $\sqrt{\frac{81}{25}}$

20. $\sqrt[3]{-27}$

21. $\sqrt[3]{8}$

22. $\sqrt{100}$

23. $\sqrt{-25}$

24. $\sqrt[3]{\frac{27}{125}}$

E. Find the real number values for $f(x) = \sqrt{x - 10}$ if they exist:

25. $f(35) =$

26. $f(5) =$

27. $f(-2) =$

28. $f(16) =$

29. What is difference in meaning of square root and principal square root?

F. Simplify manually. Do NOT approximate using calculator!

30. $\sqrt{45}$

31. $5\sqrt{90}$

32. $\sqrt{20}$

33. $\sqrt{a^4b^9}$

34. $3\sqrt{8xy^4}$

35. $\sqrt{700w^2}$

36. $\sqrt{40}$

37. $\sqrt{24}$

38. $\sqrt{27}$

39. $\sqrt{96}$

40. $\sqrt{128}$

41. $\sqrt{50}$

For G - J: Assume variables represent nonnegative numbers and denominators are not zero.

G. Simplify the following manually. (Remember the 3-R's: Reduce, Roots, Rationalize):

42. $\sqrt{\frac{32}{16}}$

43. $\frac{\sqrt{8}}{\sqrt{12}}$

44. $\sqrt{\frac{5x^3}{30x}}$

45. $\sqrt{\frac{10}{90}}$

46. $\sqrt{\frac{9a^5}{45a^7}}$

47. $\sqrt{\frac{27}{49}}$

48. $\frac{6 + \sqrt{24}}{6}$

49. $\frac{5 - \sqrt{8}}{10}$

50. $\frac{4 + \sqrt{44}}{2}$

H. Write in radical form. Simplify if possible:

51. $16^{\frac{1}{2}}$

52. $8^{\frac{2}{3}}$

53. $9^{-\frac{1}{2}}$

54. $64^{\frac{2}{3}}$

55. $4x^{\frac{1}{3}}y^{\frac{2}{3}}$

56. $(ab^2)^{\frac{1}{3}}$

I. Write using positive rational exponents.

57. $\sqrt[4]{3x}$

58. $\sqrt[3]{x^2y}$

59. $\sqrt[7]{2x^3y^5}$

60. $7\sqrt{ab}$

61. $\frac{1}{\sqrt{a}}$

62. $\frac{5}{\sqrt[3]{x}}$

J. Simplify using the rules for exponents:

63. $x^{\frac{1}{2}} \cdot x^{\frac{3}{4}}$

64. $y^{\frac{2}{5}} \cdot y^{-\frac{3}{5}}$

65. $\left(x^{\frac{2}{3}}\right)^{\frac{1}{5}}$

66. $\frac{3^{-\frac{1}{5}}}{3^{\frac{2}{5}}}$

67. $\frac{a^{\frac{2}{3}}}{a^{\frac{1}{6}}}$

68. $\left(n^{\frac{1}{2}}m^{-\frac{2}{3}}\right)^{\frac{3}{5}}$