0.5 EXERCISES

PRACTICE

Combine the radical expressions, if possible. See Example 1.

1. $\sqrt[3]{-16x^4} + 5x\sqrt[3]{2x}$

2. $\sqrt{27xy^2} - 4\sqrt{3xy^2}$

3. $\sqrt{7x} - \sqrt[3]{7x}$

4. $|x|\sqrt{8xy^2z^3} - |yz|\sqrt{18x^3z}$

5. $-x^2\sqrt[3]{54x} + 3\sqrt[3]{2x^7}$

6. $\sqrt[5]{32x^{13}} + 3x\sqrt[5]{x^8}$

7. $\sqrt[3]{-16z^4} + 6z\sqrt[3]{2z}$

8. $\sqrt[3]{7y} - \sqrt[4]{7y}$

9. $-x^2\sqrt[3]{16x} + 2\sqrt[3]{2x^7}$

Simplify the following expressions, writing your answer using the same notation as the original expression. See Example 2.

10. $\sqrt[3]{\sqrt[4]{x^{36}}}$

11. $(3x^2-4)^{\frac{1}{3}}(3x^2-4)^{\frac{5}{3}}$

12. $32^{\frac{-3}{5}}$

13. $81^{\frac{3}{4}}$

14. $\dfrac{(x-z)^y}{(x-z)^4}$

15. $\sqrt[7]{n^9}\cdot\sqrt[7]{n^5}$

16. $(-8)^{\frac{2}{3}}$

17. $\dfrac{x^{\frac{1}{5}}y^{\frac{-2}{3}}}{x^{\frac{-3}{5}}y}$

18. $(1024)^{-\frac{2}{5}}$

19. $(625)^{-\frac{3}{4}}$

20. $\sqrt[8]{49a^2}$

21. $\sqrt[3]{\sqrt[5]{y^{25}}}$

22. $\dfrac{(a-b)^{-\frac{2}{3}}}{(a-b)^{-2}}$

23. $(ax^2+by)^{\frac{3}{4}}(by+ax^2)^{-\frac{2}{3}}$

24. $\dfrac{\sqrt[3]{a^2}}{\sqrt[3]{a^5}}$

Convert the following expressions from radical notation to exponential notation, or vice versa. Simplify each expression in the process, if possible.

25. $\sqrt[4]{a^3}\cdot\sqrt[3]{a^9}$

26. $256^{-\frac{3}{4}}$

27. $\sqrt[12]{x^3}$

28. $(9y^2)^{\frac{3}{2}}(y^6)^{\frac{5}{3}}$

29. $\sqrt[6]{\dfrac{2}{72}}$

30. $(36n^4)^{\frac{5}{6}}$

Simplify the following expressions. See Example 3.

31. $\sqrt{5}\cdot\sqrt[4]{5}$

32. $\sqrt[4]{25}$

33. $\sqrt[16]{y^4}$

34. $\sqrt[4]{36}$

35. $\sqrt[3]{x^7}\cdot\sqrt[9]{x^6}$

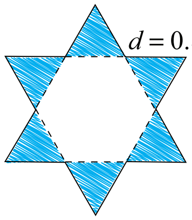
36. $\sqrt[5]{y^{16}}\cdot\sqrt[25]{y^{20}}$

37. $\sqrt[4]{7}\cdot\sqrt[16]{7}$

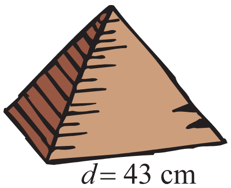
38. $\sqrt{y^4}\cdot\sqrt[6]{y^3}$

APPLICATIONS

39. A jeweler decides to construct a pendant for a necklace by simply attaching equilateral triangles to each edge of a regular hexagon. The edge length of one of the points of the resulting star is $d = 0.8$ cm. Find the formula for the area of the star in terms of d and then evaluate for $d = 0.8$ cm (rounding to three decimal places). Remember that the area of an equilateral triangle of side length d is $A = \frac{d^2\sqrt{3}}{4}$. See Example 4.



40. The pyramids in Egypt each consist of a square base and four triangular sides. For a class project, Karim constructs a model pyramid with equilateral triangles as sides. The side length is $d = 43$ cm. Find the total surface area of the pyramid (rounding to the nearest square centimeter). See Example 4.



WRITING & THINKING

41. Explain, in your own words, why exponents and roots are evaluated at the same time in the order of operations.

Apply the definition of rational exponents to demonstrate the following properties.

42. $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$

43. $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

44. $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$