



UNDERSTAND

13. **Model With Mathematics** In the expression $PV^{\frac{4}{3}}$, P represents the pressure and V represents the volume of a sample of a gas. Evaluate the expression for $P = 7$ and $V = 8$.
14. **Reason** Describe the possible values of k such that $\sqrt{32} + \sqrt{k}$ can be rewritten as a single term.
15. **Error Analysis** Explain why the following work is incorrect. Find the correct answer.

$$\begin{aligned} 5\left(4 - 5^{\frac{1}{2}}\right) &= 5(4) - 5\left(5^{\frac{1}{2}}\right) \\ &= 20 - 25^{\frac{1}{2}} \\ &= 15 \end{aligned}$$

16. **Communicate Precisely** Discuss the advantages and disadvantages of first rewriting $\sqrt{27} + \sqrt{48} + \sqrt{147}$ in order to estimate its decimal value.
17. **Higher Order Thinking** Write $\sqrt{\frac{4}{5}}$ in two different ways, one where the numerator is simplified and another where the denominator is rationalized.
18. **Construct Arguments** Justify each step used in simplifying the expression below.

$$\begin{aligned} \left(\frac{a^2}{a^4}\right)^{\frac{1}{5}} &= \left(a^{2-\frac{3}{4}}\right)^{\frac{1}{5}} \\ &= \left(a^{\frac{5}{4}}\right)^{\frac{1}{5}} \\ &= a^{\frac{1}{4}} \\ &= \sqrt[4]{a} \end{aligned}$$

PRACTICE

What is the reduced radical form of each expression? SEE EXAMPLE 1

19. $(3x^{\frac{1}{2}})(4x^{\frac{2}{3}})$ 20. $2b^{\frac{1}{2}}\left(3b^{\frac{1}{2}}c^{\frac{1}{3}}\right)^2$

21. $(x^{\frac{1}{2}} \cdot x^{\frac{5}{12}})^4 \div x^{\frac{2}{3}}$ 22. $\left(\frac{16c^{14}}{81d^{18}}\right)^{\frac{1}{2}}$

What is the reduced radical form of each expression? SEE EXAMPLE 2

23. $\sqrt[3]{250y^2z^4}$ 24. $\sqrt[4]{256v^7w^{12}}$

25. $\sqrt{\frac{48x^3}{3xy^2}}$ 26. $\sqrt{\frac{56x^5y^5}{7xy}}$

27. $\sqrt[3]{216m}$ 28. $\sqrt[3]{\frac{250f^7g^3}{2f^2g}}$

What is the reduced radical form of each expression? SEE EXAMPLE 3

29. $\sqrt{x^5y^5} \cdot 3\sqrt{2x^7y^6}$ 30. $\sqrt[3]{\frac{18n^2}{24n}}$

31. $\sqrt[3]{3x^2} \cdot \sqrt[3]{x^2} \cdot \sqrt[3]{9x^3}$ 32. $\sqrt{\frac{162a}{6a^3}}$

33. $\sqrt[5]{2pq^6} \cdot 2\sqrt{2p^3q}$ 34. $\sqrt[3]{\frac{x^2}{9y}}$

35. $\sqrt[3]{6} \cdot \sqrt[3]{16}$ 36. $\sqrt[4]{\frac{2}{5x}}$

What is the reduced radical form of each expression? SEE EXAMPLE 4

37. $4\sqrt[3]{81} - 2\sqrt[3]{72} - \sqrt[3]{24}$ 38. $6\sqrt{45y^2} - 4\sqrt{20y^2}$

39. $3\sqrt{12} - \sqrt{54} + 7\sqrt{75}$ 40. $\sqrt{32h} + 4\sqrt{98h} - 3\sqrt{50h}$

Multiply. SEE EXAMPLE 5

41. $(3\sqrt{p} - \sqrt{5})(\sqrt{p} + 5\sqrt{5})$ 42. $(4m - \sqrt{3})(4m - \sqrt{3})$

43. $(3\sqrt{2} + 8)(3\sqrt{2} - 8)$ 44. $\sqrt[3]{3}(5\sqrt[3]{9} - 4)$

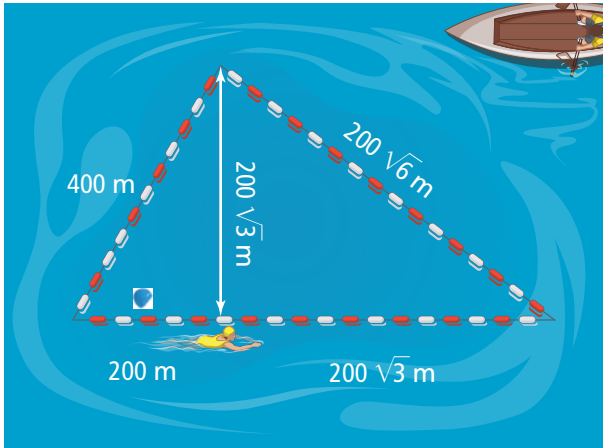
What is the reduced radical form of each expression? SEE EXAMPLE 6

45. $\frac{4}{1 - \sqrt{3}}$ 46. $\frac{20}{3 + \sqrt{2}}$

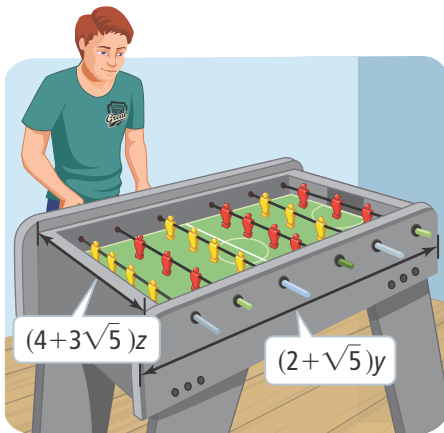
47. $\frac{3 + \sqrt{8}}{2 - 2\sqrt{8}}$ 48. $\frac{-2x}{3 + \sqrt{x}}$

APPLY

49. **Model With Mathematics** A triangular swimming area is marked off by a rope.
- If a woman swims around the perimeter of the swimming area, how far will she swim?
 - What is the area of the roped off section?



50. **Use Structure** The interest rate r required to increase your investment p to the amount a in m months is found by $r = \left(\frac{a}{p}\right)^{\frac{1}{m}} - 1$. What interest rate would be required to increase your investment of \$3,600 to \$6,400 over 7 months? Round your answer to the nearest tenth of a percent.
51. **Use Structure** The length of a rectangle is $(2 + \sqrt{5})y$. The width is $(4 + 3\sqrt{5})z$. What is the area of the rectangle?



52. **Model With Mathematics** A rectangular boardroom table is $\sqrt{440}$ ft by $\sqrt{20}$ ft. Find its area.

ASSESSMENT PRACTICE

53. Aaron is rewriting $\frac{1 + \sqrt{3}}{5 - \sqrt{3}}$ into reduced radical form. Determine if Aaron would have written the steps below to show his work. Select Yes or No.

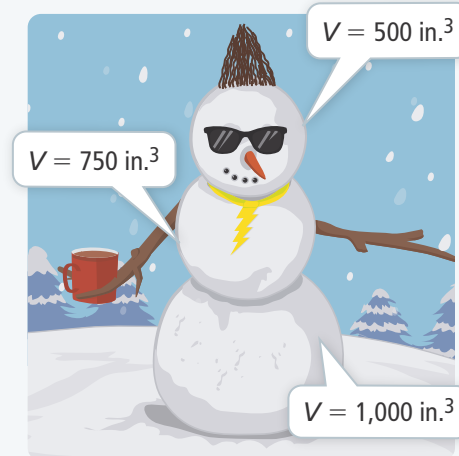
	Yes	No
$\frac{6 + 4\sqrt{3} - 3}{25 + 9}$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{5 + \sqrt{3} + 5\sqrt{3} + \sqrt{9}}{25 + 5\sqrt{3} - 5\sqrt{3} - \sqrt{9}}$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{4 + 3\sqrt{3}}{11}$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{8 + 6\sqrt{3}}{28}$	<input type="checkbox"/>	<input type="checkbox"/>
$\frac{5 + 6\sqrt{3} + 3}{25 - 3}$	<input type="checkbox"/>	<input type="checkbox"/>

54. **SAT/ACT** Which expression cannot be rewritten as -10 ?
- $\sqrt{25} \cdot \sqrt[3]{-8}$
 - $\sqrt[3]{-125} \cdot \sqrt[4]{16}$
 - $-\sqrt[3]{1,000}$
 - $-\sqrt{25} \cdot \sqrt[5]{-32}$
 - $\sqrt[4]{4} \cdot -\sqrt[3]{125}$

55. **Performance Task** The volume of a sphere of radius r is $V = \frac{4}{3}\pi r^3$.

Part A Use the formula to find r in terms of V . Rationalize the denominator.

Part B A snowman is made using three spherical snowballs. The top snowball for the head has a volume of 500 in.^3 . What is the diameter of the top snowball?



Part C The volumes of the other two snowballs are 750 in.^3 and $1,000 \text{ in.}^3$. How tall is the snowman?