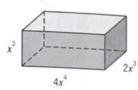**Simplify each expression.** (Lesson 7-1)

1. $(x^3)(4x^5)$

2. $(m^2 p^5)^3$

3. $[(2xy^3)^2]^3$

4. $(6ab^3c^4)(-3a^2b^3c)$

5. **MULTIPLE CHOICE** Express the volume of the solid as a monomial. (Lesson 7-1)

A $6x^9$

B $8x^9$

C $8x^{24}$

D $7x^{24}$

Simplify each expression. Assume that no denominator equals 0. (Lesson 7-2)

6. $\left(\dfrac{2a^4b^3}{c^6}\right)^3$

7. $\dfrac{2xy^0}{6x}$

8. $\dfrac{m^7n^4p}{m^3n^3p}$

9. $\dfrac{p^4t^{-2}}{r^{-5}}$

10. **ASTRONOMY** Physicists estimate that the number of stars in the universe has an order of magnitude of 10^{21}. The number of stars in the Milky Way galaxy is around 100 billion. Using orders of magnitude, how many times as many stars are there in the universe as the Milky Way? (Lesson 7-2)

Write each expression in radical form, or write each radical in exponential form. (Lesson 7-3)

11. $42^{\frac{1}{2}}$

12. $11x^{\frac{1}{2}}$

13. $(11g)^{\frac{1}{2}}$

14. $\sqrt{55}$

15. $\sqrt{5k}$

16. $4\sqrt{p}$

Simplify. (Lesson 7-3)

17. $\sqrt[3]{729}$

18. $\sqrt[4]{625}$

19. $1331^{\frac{1}{3}}$

20. $\left(\dfrac{16}{81}\right)^{\frac{1}{4}}$

21. $8^{\frac{2}{3}}$

22. $625^{\frac{3}{4}}$

23. $216^{\frac{5}{3}}$

24. $\left(\dfrac{1}{4}\right)^{\frac{3}{2}}$

Solve each equation. (Lesson 7-3)

25. $4^x = 4096$

26. $5^{2x+1} = 125$

27. $4^{x-3} = 128$

Express each number in scientific notation. (Lesson 7-4)

28. 0.00000054

29. 0.0042

30. 234,000

31. 418,000,000

Express each number in standard form. (Lesson 7-4)

32. 4.1×10^{-3}

33. 2.74×10^5

34. 3×10^9

35. 9.1×10^{-5}

Evaluate each product or quotient. Express the results in scientific notation. (Lesson 7-4)

36. $(2.13 \times 10^2)(3 \times 10^5)$

37. $(7.5 \times 10^6)(2.5 \times 10^{-2})$

38. $\dfrac{7.5 \times 10^8}{2.5 \times 10^4}$

39. $\dfrac{6.6 \times 10^5}{2 \times 10^{-3}}$

40. **MAMMALS** A blue whale has been caught that was 4.2×10^5 pounds. The smallest mammal is a bumblebee bat, which is about 0.0044 pound.

a. Write the whale's weight in standard form.

b. Write the bat's weight in scientific notation.

c. How many orders of magnitude as big as a blue whale is a bumblebee bat?