

P 466 #31 - #48

SIMPLIFYING EXPRESSIONS Simplify the expression. The simplified expression should have no negative exponents.

31. $\left(\frac{3}{x}\right)^4$ 32. $\frac{x^4}{x^5}$ 33. $\left(\frac{1}{x}\right)^5$ 34. $x^3 \cdot \frac{1}{x^2}$
 35. $x^5 \cdot \frac{1}{x^8}$ 36. $\left(\frac{a^9}{a^5}\right)^{-1}$ 37. $\left(\frac{y^2}{y^3}\right)^{-2}$ 38. $\frac{m^3 \cdot m^5}{m^2}$
 39. $\frac{(r^3)^4}{(r^3)^8}$ 40. $\left(\frac{-6x^2y}{2xy^3}\right)^3$ 41. $\left(\frac{2x^3y^4}{3xy}\right)^3$ 42. $\frac{16x^3y}{-4xy^3} \cdot -\frac{2xy}{-x^{-1}}$
 43. $\frac{4x^3y^3}{2xy} \cdot \frac{5xy^2}{2y}$ 44. $\frac{36a^8b^2}{ab} \cdot \left(\frac{6}{ab^2}\right)^{-1}$
 45. $\frac{16x^5y^{-8}}{x^7y^4} \cdot \left(\frac{x^3y^2}{8xy}\right)^4$ 46. $\frac{6x^{-2}y^2}{xy^{-3}} \cdot \frac{(4x^2y)^{-2}}{xy^2}$
 47. $\frac{5x^{-3}y^2}{x^5y^{-1}} \cdot \frac{(2xy^3)^{-2}}{xy}$ 48. $\left(\frac{2xy^{-2}y^4}{3x^{-1}y}\right)^{-2} \cdot \left(\frac{4xy}{2x^{-1}y^{-3}}\right)^2$

P 467 #54 - #56

ATLANTIC COD In Exercises 54–56, use the following information.
 The average weight w (in pounds) of an Atlantic cod t years old can be modeled by the equation $w = 1.16(1.44)^t$. $\blacktriangleright$ Source: National Marine Fisheries Service, Northeast Science Center

54. Find the ratio of the weight of a 5-year-old cod to the weight of a 2-year-old cod. Express this ratio as a power of 1.44.
 55. A 5-year-old cod weighs how many times as much as a 2-year-old cod?
 56. According to the model, what is the average weight of an Atlantic cod when it is hatched? How did you get your answer?

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DECIMAL FORM Rewrite in decimal form.

16. 2.14×10^4 17. 98×10^{-2} 18. 7.75×10^0
 19. 8.6521×10^3 20. 4.65×10^{-4} 21. 6.002×10^{-6}
 22. 4.332×10^8 23. 1.00012×10^8 24. 1.1098×10^{10}

SCIENTIFIC NOTATION Rewrite in scientific notation.

25. 0.05 26. 95.2 27. 0.0422 28. 370.207
 29. 700,000,000 30. 19.314 31. 0.008551 32. 2,730,000,000
 33. 0.000459 34. 0.00032954 35. 88,000,000 36. 0.0000288

EVALUATING EXPRESSIONS Evaluate the expression without using a calculator. Write the result in scientific notation and in decimal form.

37. $(4 \times 10^{-2}) \cdot (3 \times 10^6)$ 38. $(7 \times 10^{-3}) \cdot (8 \times 10^{-4})$
 39. $(6 \times 10^5) \cdot (2.5 \times 10^{-1})$ 40. $(1.2 \times 10^{-6}) \cdot (2.3 \times 10^4)$
 41. $\frac{8 \times 10^{-3}}{5 \times 10^{-5}}$ 42. $\frac{1.4 \times 10^{-1}}{3.5 \times 10^{-4}}$ 43. $\frac{6.6 \times 10^{-1}}{1.1 \times 10^{-1}}$
 44. $(3.0 \times 10^{-3})^2$ 45. $(9 \times 10^3)^2$ 46. $(3 \times 10^{-2})^4$

P 474 #61 - #62

61. **WATERFALL** Stanley Falls in Congo, Africa, has an average flow of about 1.7×10^4 cubic meters per second. How much water goes over Stanley Falls in a typical 30-day month?
 62. **HEARTBEATS** Consider a person whose heart beats 70 times per minute and who lives to be 85 years old. Estimate the number of times the person's heart beats during his or her life. Do not acknowledge leap years. Write your answer in decimal form and in scientific notation.