

Exponents and Polynomials

Review 7.1 / Exponents, Part 2

7.1.4 An Application of Exponents: Scientific Notation

1. **Statistics** At the beginning of the twenty-first century, the population of China was about 1,287,000,000. Write this number in scientific notation.
2. **Biology** The human body is made of about 1×10^{13} cells. Write this number in standard form.

Find the value of each expression.

3. 9.2×10^4
4. 1.25×10^{-7}
5. 42×10^{-5}
6. 0.05×10^7

7. Order the list of numbers from least to greatest.
 2.13×10^{-1} , 3.12×10^2 , 1.23×10^{-3} , 2.13×10^1 , 1.32×10^{-3} , 3.12×10^{-3}

Simplify each quotient and write the answer in scientific notation.

8. $(4.7 \times 10^{-3}) \div (9.4 \times 10^3)$
9. $(8.4 \times 10^9) \div (4 \times 10^{-5})$

10. $(4.2 \times 10^{-5}) \div (6 \times 10^{-3})$
11. $(2.1 \times 10^2) \div (8.4 \times 10^5)$

12. **Geography** Rhode Island is the smallest state in the United States. Its land area is about 2.9×10^{10} square feet. Alaska, the largest state, is about 5.5×10^2 times as large as Rhode Island. What is the land area of Alaska in square feet? Write your answer in scientific notation.

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13. **Astronomy** The mass of Earth is about 3×10^{-3} times the mass of Jupiter. The mass of Earth is about 6×10^{24} kg. What is the mass of Jupiter? Give your answer in scientific notation.

7.1.5 Fractional Exponents

Simplify each expression.

14. $100^{\frac{1}{2}}$

15. $1^{\frac{1}{5}}$

16. $512^{\frac{1}{3}}$

17. $729^{\frac{1}{2}}$

18. $32^{\frac{1}{5}}$

19. $196^{\frac{1}{2}}$

20. $256^{\frac{1}{8}}$

21. $400^{\frac{1}{2}}$

22. $125^{\frac{1}{3}} + 81^{\frac{1}{2}}$

23. $25^{\frac{1}{2}} - 81^{\frac{1}{4}}$

24. $121^{\frac{1}{2}} - 243^{\frac{1}{5}}$

25. $256^{\frac{1}{4}} + 0^{\frac{1}{3}}$

26. $4^{\frac{3}{2}}$

27. $27^{\frac{2}{3}}$

28. $256^{\frac{3}{4}}$

29. $64^{\frac{5}{6}}$

30. $100^{\frac{3}{2}}$

31. $1^{\frac{5}{3}}$

32. $9^{\frac{5}{2}}$

33. $243^{\frac{2}{5}}$

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34. **Biology** Biologists use a formula to estimate the mass of a mammal's brain. For a mammal with a mass of m grams, the approximate mass B of the brain, also in grams, is given by $B = \frac{1}{8}m^{\frac{2}{3}}$. Find the approximate mass of the brain of a mouse that has a mass of 64 grams.

Simplify. All variables represent nonnegative numbers.

35. $\sqrt[3]{a^6c^9}$

36. $\sqrt[3]{8m^3}$

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

38. $\sqrt[3]{27x^6}$

39. $\left(\frac{1}{x^2y^3}\right)^2\sqrt{x^2}$

40. $(a^2b^4)^{\frac{1}{2}}\sqrt[3]{b^6}$

41. $\frac{\sqrt[3]{x^6y^6}}{yx^2}$

42. $\frac{\left(a^2b^{\frac{1}{2}}\right)^4}{\sqrt{b^2}}$