NAME _____ DATE _____

Module 11 Simplifying Algebraic Expressions with Polynomials
Lesson 2 Using Scientific Notation

Write in scientific notation.

1. 2,500,000 _____

2. 0.003 _____

3. 0.0000025 _____

4. 108,000 _____

5. The thickness of a sheet of paper is approximately 0.0001 m or _____ m.

6. The circumference of Earth is about 40,000 km or _____ km.

Write in standard notation.

7. 2.4×10^3 _____

8. 3.672×10^8 _____

9. 9×10^{-5} _____

10. 2.59×10^{-4} _____

11. In 2000, the population of the United States was about 2.8×10^8 or _____ people.

12. A paramecium is about 2.1×10^{-4} m or _____ m wide.

Multiply or divide as indicated. Write answers in scientific notation and round to two decimal places.

13. $(2.4 \times 10^4)(3 \times 10^3)$

14. $(3.8 \times 10^{-2})(1.4 \times 10^{-3})$

15. $\frac{1.4 \times 10^3}{5.6 \times 10^8}$

16. $\frac{3.4 \times 10^4}{1.7 \times 10^{-3}}$

17. The population of Alaska is approximately 6.4×10^5 people. The population of Illinois is about 1.26×10^7 people. How many times greater is the population of Illinois than the population of Alaska?

18. The mass of Earth is 5.98×10^{27} g. The mass of Jupiter is 3.2×10^2 times as great. Find the mass of Jupiter.

19. The distance from Mercury to the sun is 3.6×10^7 miles. The distance from Pluto to the sun is 3.6×10^9 miles. How many times further is Pluto from the sun?

20. In 2000, the resident population of the United States was 2.814×10^8. There were 1.049×10^8 occupied housing units. On the average, how many residents were there per housing unit?

21. One electron has a mass of 9.1×10^{-31} kg. Find the mass of one billion electrons.

22. The speed of light is 3×10^8 m/s. The speed of sound is about 3.5×10^2 m/s. How many times faster does light travel than sound?

23. In 1990, there were 5.3×10^6 cell phone subscribers. By 2001, this number had increased 2.42×10^1 times. How many cell phone subscribers were there in 2001?

24. In 2000, 3.168×10^{12} dollars of merchandise was sold in retail stores in the US. If there were 2.814×10^8 people in the US at that time, what was the average number of dollars spent by each person in retail stores?

Journal

1. Explain how to change 25×10^5 to scientific notation.
2. Miguel says learning scientific notation is too much trouble, and he sees no reason to use any numbers other than standard notation. Explain to Miguel why it is necessary to use scientific notation.
3. Explain how the properties of exponents are used to multiply numbers in scientific notation.
4. What do negative exponents mean when using scientific notation?
5. Explain how to find the quotient of (9×10^4) and (3×10^7) without using a calculator.

Cumulative Review

Simplify.

1. $x^3y^8 \cdot x^4y^9$

2. $3a(a^3b)^4$

3. $(2m^2n^4)^3$

4. $2^3 \cdot 3^4$

5. $\frac{g^5}{g^{-3}}$

6. $\frac{2^4a^3b^{-6}}{2^2a^3b^{-5}}$

7. $\left(\frac{5c^3}{c^{-3}}\right)^{-4}$

8. $\left(\frac{r^3}{s^5}\right)^{-2}$

9. $\frac{(x^8y^{-3}z^4)^2}{(x^{-3}y^{-2}z^9)^3}$

10. $\frac{(2^3m^{-3}n^{-5})^3}{(2m^4n^{-6})^{-2}}$

Calculator Problem

Find the product of (4×10^2) and (6.72×10^{-6}).

1. Put the calculator in scientific mode by pressing MODE, right arrow, ENTER, CLEAR.
2. Enter the expressions into the calculator. Press 4, 2nd, EE, 2, ×, 6, ., 7, 2, 2nd, EE, (−), 6, ENTER.
3. The calculator screen will show 2.688E–3. The number after the E represents the exponent of 10 in scientific notation. Write this answer as 2.688×10^{-3}.

Find each product or quotient. Write answers in scientific notation.

1. $(3 \times 10^3)(6 \times 10^{-2})$ _____
2. $(5 \times 10^3)(7.45 \times 10^9)$ _____
3. $\dfrac{8.2 \times 10^4}{2.05 \times 10^{12}}$ _____
4. $\dfrac{9 \times 10^{-3}}{4 \times 10^{-6}}$ _____