NAME _____ DATE _____ PERIOD ____

8-3 Study Guide and Intervention

Scientific Notation

Scientific Notation Keeping track of place value in very large or very small numbers written in standard form may be difficult. It is more efficient to write such numbers in scientific notation. A number is expressed in scientific notation when it is written as a product of two factors, one factor that is greater than or equal to 1 and less than 10 and one factor that is a power of ten.

Scientific Notation	A number is in scientific notation when it is in the form $a \times 10^n$, where $1 \leq a < 10$ and n is an integer.

Example 1 **Express 3.52×10^4 in standard notation.**

$3.52 \times 10^4 = 3.52 \times 10{,}000$
$= 35{,}200$

The decimal point moved 4 places to the right.

Example 2 **Express 6.21×10^{-5} in standard notation.**

$6.21 \times 10^{-5} = 6.21 \times \frac{1}{10^5}$
$= 6.21 \times 0.00001$
$= 0.0000621$

The decimal point moved 5 places to the left.

Example 3 **Express 37,600,000 in scientific notation.**

$37{,}600{,}000 = 3.76 \times 10^7$

The decimal point moved 7 places so that it is between the 3 and the 7. Since $37{,}600{,}000 > 1$, the exponent is positive.

Example 4 **Express 0.0000549 in scientific notation.**

$0.0000549 = 5.49 \times 10^{-5}$

The decimal point moved 5 places so that it is between the 5 and the 4. Since $0.0000549 < 1$, the exponent is negative.

Exercises

Express each number in standard notation.

1. 3.65×10^5 **2.** 7.02×10^{-4} **3.** 8.003×10^8

4. 7.451×10^6 **5.** 5.91×10^0 **6.** 7.99×10^{-1}

7. 8.9354×10^{10} **8.** 8.1×10^{-9} **9.** 4×10^{15}

Express each number in scientific notation.

10. 0.0000456 **11.** 0.00001 **12.** 590,000,000

13. 0.00000000012 **14.** 0.000080436 **15.** 0.03621

16. 433×10^4 **17.** 0.0042×10^{-3} **18.** 50,000,000,000

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8-3 Skills Practice

Scientific Notation

Express each number in standard notation.

1. 4×10^3

2. 2×10^8

3. 3.2×10^5

4. 3×10^{-6}

5. 9×10^{-2}

6. 4.7×10^{-7}

ASTRONOMY Express the number in each statement in standard notation.

7. The diameter of Jupiter is 1.42984×10^5 kilometers.

8. The surface density of the main ring around Jupiter is 5×10^{-6} grams per centimeter squared.

9. The minimum distance from Mars to Earth is 5.45×10^7 kilometers.

Express each number in scientific notation.

10. 41,000,000

11. 65,100

12. 283,000,000

13. 264,701

14. 0.019

15. 0.000007

16. 0.000010035

17. 264.9

18. 150×10^2