

# Scientific Notation (Pages 352–356)

Very large or very small numbers can be written in **scientific notation**.

<b>Scientific Notation</b>	A number is expressed in scientific notation when it is in the form $a \times 10^n$ , where $1 \leq a < 10$ and $n$ is an integer.
<b>Multiplying by Powers of 10</b>	<ul style="list-style-type: none"> <li>If the exponent is <i>positive</i>, you move the decimal point to the <i>right</i>.</li> <li>If the exponent is <i>negative</i>, you move the decimal point to the <i>left</i>.</li> </ul>

Follow these steps to write a number in scientific notation.

- First, place the decimal point after the first nonzero digit.
- Then, find the power of ten by counting the decimal places. When the number is greater than 1, the exponent is positive. When the number is between 0 and 1, the exponent is negative.

## EXAMPLES

**Express each measurement in standard form.**

**A** 4 gigabytes

$$4 \text{ gigabytes} = 4 \times 10^9 \\ = 4,000,000,000 \text{ bytes}$$

**B** 1.5 milliamperes

$$1.5 \text{ milliamperes} = 1.5 \times 10^{-3} \\ = 0.0015 \text{ ampere}$$

**Express each number in scientific notation.**

**C** 34,000,000

$$34,000,000 = 3.4 \times 10^7$$

**D** 0.0000028

$$0.0000028 = 2.8 \times 10^{-6}$$

## PRACTICE

**Express each measure in standard form.**

1. 3 milliseconds

2. 2.5 gigabytes

3. 5 kilowatts

**Express each number in scientific notation.**

4. 3500

5. 0.0015

6. 43.8

7. 0.0000000485

**Evaluate each expression. Express each result in scientific notation and standard form.**

8.  $(5 \times 10^1)(1.5 \times 10^4)$

9.  $(6 \times 10^{-3})(0.4 \times 10^{-1})$

10.  $(2 \times 10^6)(3.7 \times 10^{-4})$

11.  $\frac{26 \times 10^3}{6.5 \times 10^9}$

12.  $\frac{9.5 \times 10^8}{1.9 \times 10^2}$

13.  $\frac{3.51 \times 10^{-7}}{2.7 \times 10^2}$



**14. Standardized Test Practice** Evaluate  $(1.4 \times 10^8) \div (0.7 \times 10^{-3})$ .

**A**  $2 \times 10^4$

**B**  $2 \times 10^5$

**C**  $2 \times 10^{10}$

**D**  $2 \times 10^{11}$

**Answers:** 1. 0.003 second 2. 2,500,000,000 bytes 3. 5000 watts 4.  $3.5 \times 10^5$  5.  $1.5 \times 10^{-3}$  6. 4.38  $\times 10^1$  7.  $4.85 \times 10^{-8}$  8.  $7.5 \times 10^5 = 750,000$  9.  $2.4 \times 10^{-4} = 0.00024$  10.  $7.4 \times 10^2 = 740$  11.  $4 \times 10^{-6} = 0.000004$  12.  $5 \times 10^6 = 5,000,000$  13.  $1.3 \times 10^{-9} = 0.0000000013$  14. D