Lesson 8-3

Example 1 Scientific to Standard Notation
Express each number in standard notation.

a. 1×10^{6}

$1 \times 10^{6} = 1{,}000{,}000$ $n = 6$; move decimal point 6 places to the right.

b. 6.31×10^{-3}

$6.31 \times 10^{-3} = 0.00631$ $n = -3$; move decimal point 3 places to the left.

Example 2 Standard to Scientific Notation
Express each number in scientific notation.

a. **0.000501**

$0.000501 \rightarrow 00005.01 \times 10^{n}$ Move decimal point 4 places to the right.

$0.000501 = 5.01 \times 10^{-4}$ $a = 5.01$ and $n = -4$

b. **162.1**

$162.1 \rightarrow 1.621 \times 10^{n}$ Move decimal point 2 places to the left.

$162.1 = 1.621 \times 10^{2}$ $a = 1.621$ and $n = 2$

Example 3   Use Scientific Notation
The table shows the U.S. surplus or deficit in millions for 1995 through 2001.

Year	1996	1997	1998	1999	2000	2001
Surplus or Deficit(-)	$-107,331	$-21,957	$70,039	$124,360	$236,993	$121,000

Source: The World Almanac

a. **Express the surplus or deficit for 1996, 1998 and 2000 in standard notation.**

1996: -$107,331 million = -$107,331,000,000
1998: $70,039 million = $70,039,000,000
2000: $236,993 million = $236,993,000,000

b. **Express the surplus of deficit for 1996, 1998 and 2000 in scientific notation.**

1996: -$107,331,000,000 = -$1.07331 \times 10^{11}$
1998: $ 70,039,000,000 = 7.0039×10^{10}
2000: $236,993,000,000 = 2.36993×10^{11}

Example 4   Multiplication with Scientific Notation

Evaluate $(4.1 \times 10^{-5})(8.2 \times 10^{-2})$. Express the result in scientific and standard notation.

$(4.1 \times 10^{-5})(8.2 \times 10^{-2})$

$= (4.1 \times 10^{-5})(8.2 \times 10^{-2})$	Commutative and Associative Properties
$= 33.62 \times 10^{-7}$	Product of Powers
$= (3.362 \times 10^{1}) \times 10^{-7}$	$33.62 = 3.362 \times 10^{1}$
$= 3.362 \times (10^{1} \times 10^{-7})$	Associative Property
$= 3.362 \times 10^{-6}$ or 0.000003362	Product of Powers

Example 5   Division with Scientific Notation

Evaluate $\dfrac{5.612 \times 10^{-7}}{3.68 \times 10^{-6}}$. Express the result in scientific and standard notation.

$$\frac{5.612 \times 10^{-7}}{3.68 \times 10^{-6}} = \left(\frac{5.612}{3.68}\right)\left(\frac{10^{-7}}{10^{-6}}\right) \qquad \text{Associative Property}$$

$$= 1.525 \times 10^{-1} \text{ or } 0.1525 \qquad \text{Quotient of Powers}$$