

# Algebra 1

Lesson 8.4  
Use Scientific Notation

### Warm-Up

Simplify. Write all answers using *only positive exponents*.

(a)  $\left(\frac{5}{2}\right)^{-3}$

$$\frac{5^{-3}}{2^{-3}} = \frac{2^3}{5^3} = \frac{8}{125}$$

(b)  $2^{-7} \cdot 2^3$

$$2^{-4} = \frac{1}{2^4}$$

$$\frac{1}{16}$$

(c)  $6a^{-4}b^0$

$$6a^{-4}$$

$$\frac{6}{a^4}$$

(d)  $\frac{8x^3y^{-4}}{12x^2y^{-3}}$

$$\frac{2x}{3y}$$

$$y^3$$

### Scientific Notation:

A convenient way to write extremely large or extremely small numbers.

Scientific notation uses a coefficient multiplied by some power of 10.

$$a \times 10^n \text{ where } 1 \leq a < 10$$

### Example 1. Write Numbers in Scientific Notation

(a)  $267,500,000$

$$2.675 \times 10^8$$

(b)  $0.000486$

$$4.86 \times 10^{-4}$$

### Example 2. Write Numbers in Standard Form

(a)  $7.02345 \times 10^5$  RIGHT  $\rightarrow$

$$702,345$$

(b)  $3.096 \times 10^{-6}$  LEFT  $\leftarrow$

$$.000003096$$

### Try It!

Write each value in scientific notation.

(a)  $539,000$

$$5.39 \times 10^5$$

(b)  $0.000475$

$$4.75 \times 10^{-4}$$

Write each value in standard form.

(a)  $2.56 \times 10^{-4}$

$$0.000256$$

(b)  $1.036 \times 10^7$

$$10,360,000$$

**Example 3. Evaluate in Scientific Notation**

Evaluate each expression. Be sure the final answer is written in scientific notation.

(a)  $(1.4 \times 10^7)(4.5 \times 10^8)$

$$\frac{(1.4 \times 4.5)(10^7 \times 10^8)}{6.3 \times 10^{15}}$$

(c)  $(4.2 \times 10^6)^2$

$$\frac{17.64 \times 10^{12}}{1.764 \times 10^{13}}$$

(e)  $\frac{9.6 \times 10^9}{1.2 \times 10^2}$

$$8.0 \times 10^7$$

(b)  $(6.8 \times 10^6)(9 \times 10^9)$

$$(6.8 \times 9)(10^6 \times 10^9)$$

$$\frac{61.2 \times 10^{15}}{6.12 \times 10^{16}}$$

(d)  $(2.5 \times 10^5)^{-3}$

$$2.5^{-3} \times 10^{-15}$$

$$\frac{1}{2.5^3} \times 10^{-15} =$$

$$\frac{0.064 \times 10^{-15}}{6.4 \times 10^{-17}}$$

(f)  $\frac{1.68 \times 10^5}{2.24 \times 10^9}$

$$\frac{0.75 \times 10^{-4}}{7.5 \times 10^{-5}}$$

$$7.5 \times 10^{-5}$$

$61.2 = 6.12 \times 10^1$

$0.064 = 6.4 \times 10^{-2}$

**Try It!**

Evaluate each expression. Be sure the final answer is written in scientific notation.

(a)  $(5.7 \times 10^3)(2.6 \times 10^4)$

$$14.82 \times 10^7$$

$$1.482 \times 10^8$$

(b)  $(2.4 \times 10^{-4})^2$

$$5.76 \times 10^{-8}$$

(c)  $\frac{2.4 \times 10^5}{2.5 \times 10^{-4}}$

$$0.96 \times 10^9$$

$$9.6 \times 10^8$$

**Assignment**

New: Pg. 515 #4 - 56 (every other even)

**Review:**

1.  $\frac{24x^3y^5}{-8x^7y^2}$

2.  $\frac{x^{-3}y^{-3}}{x^2y^{-2}}$

3.  $\left(\frac{2x^2y^{-1}}{z^{-2}}\right)^2 \left(\frac{y^4z^3}{8x^{-3}}\right)$

4.  $(1+2^{-1})^{-1}$