**EXAMPLE 3** **Order numbers in scientific notation**

**Order 103,400,000, $7.8 \times 10^8$, and 80,760,000 from least to greatest.**

**Solution**

**STEP 1** **Write** each number in scientific notation, if necessary.
$$103,400,000 = 1.034 \times 10^8 \qquad 80,760,000 = 8.076 \times 10^7$$

**STEP 2** **Order** the numbers. First order the numbers with different powers of 10. Then order the numbers with the same power of 10.

Because $10^7 < 10^8$, you know that $8.076 \times 10^7$ is less than both $1.034 \times 10^8$ and $7.8 \times 10^8$. Because $1.034 < 7.8$, you know that $1.034 \times 10^8$ is less than $7.8 \times 10^8$.

So, $8.076 \times 10^7 < 1.034 \times 10^8 < 7.8 \times 10^8$.

**STEP 3** **Write** the original numbers in order from least to greatest.
80,760,000; 103,400,000; $7.8 \times 10^8$

**EXAMPLE 4** **Compute with numbers in scientific notation**

**Evaluate the expression. Write your answer in scientific notation.**

**a.** $(8.5 \times 10^2)(1.7 \times 10^6)$

$= (8.5 \cdot 1.7) \times (10^2 \cdot 10^6)$    **Commutative property and associative property**

$= 14.45 \times 10^8$    **Product of powers property**

$= (1.445 \times 10^1) \times 10^8$    **Write 14.45 in scientific notation.**

$= 1.445 \times (10^1 \times 10^8)$    **Associative property**

$= 1.445 \times 10^9$    **Product of powers property**

**AVOID ERRORS**
Notice that $14.45 \times 10^8$ is *not* written in scientific notation because 14.45 > 10.

**b.** $(1.5 \times 10^{-3})^2 = 1.5^2 \times (10^{-3})^2$    **Power of a product property**

$= 2.25 \times 10^{-6}$    **Power of a power property**

**REVIEW FRACTIONS**
For help with fractions, see p. 915.

**c.** $\dfrac{1.2 \times 10^4}{1.6 \times 10^{-3}} = \dfrac{1.2}{1.6} \times \dfrac{10^4}{10^{-3}}$    **Product rule for fractions**

$= 0.75 \times 10^7$    **Quotient of powers property**

$= (7.5 \times 10^{-1}) \times 10^7$    **Write 0.75 in scientific notation.**

$= 7.5 \times (10^{-1} \times 10^7)$    **Associative property**

$= 7.5 \times 10^6$    **Product of powers property**

✓ **GUIDED PRACTICE** **for Examples 3 and 4**

**2.** Order $2.7 \times 10^5$, $3.401 \times 10^4$, and 27,500 from least to greatest.

**Evaluate the expression. Write your answer in scientific notation.**

**3.** $(1.3 \times 10^{-5})^2$      **4.** $\dfrac{4.5 \times 10^5}{1.5 \times 10^{-2}}$      **5.** $(1.1 \times 10^7)(4.2 \times 10^2)$