8.4 Use Scientific Notation

Goal • Read and write numbers in scientific notation.

Your Notes

VOCABULARY

Scientific notation

SCIENTIFIC NOTATION

A number is written in scientific notation when it is of the form _____ where $1 \leq c < 10$ and n is an integer.

Number	Standard form	Scientific notation
Sixteen million	_____	_____
Two hundredths	_____	_____

Example 1 *Write numbers in scientific notation*

a. 7,820,000 = _____ × 10___ **Move decimal point ___ places to the _____. Exponent is _____.**

b. 0.00401 = _____ × 10____ **Move decimal point ___ places to the _____. Exponent is _____.**

Example 2 *Write numbers in standard form*

a. 3.89×10^9 = _____ **Exponent is _____. Move decimal point ___ places to the _____.**

b. 9.097×10^{-5} = _____ **Exponent is _____. Move decimal point ___ places to the _____.**

Your Notes

Checkpoint **Complete the following exercise.**

1. Write the number 0.0899 in scientific notation. Then write the number 6.0001×10^7 in standard form.

Example 3 ***Order numbers in scientific notation***

Order 3.2×10^{-4}, 0.0004, and 2.8×10^{-5} from least to greatest.

Solution

Step 1 **Write** each number in scientific notation, if necessary.

$0.0004 =$ _____

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^{-5} ___ 10^{-4}, you know that _____ is less than both _____ and _____. Because 3.2 ___ 4, you know that _____ is less than _____.

So, _____ < _____ < _____.

Step 3 **Write** the original numbers in order from least to greatest.

_____

Checkpoint **Complete the following exercise.**

2. Order 225,000, 1,740,000, and 1.75×10^5 from least to greatest.

Your Notes

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

Evaluate the expression. Write your answer in scientific notation.

a. $(5.6 \times 10^{-4})(1.4 \times 10^{-5})$

$= (5.6 \cdot 1.4) \times (10^{-4} \cdot 10^{-5})$ **Commutative property and associative property**

$=$ _____ $\times$ _____ **Product of powers property**

b. $(3.2 \times 10^{2})^{3}$

$=$ _____ $\times$ _____ **Power of a product property**

$=$ _____ $\times$ _____ **Power of a power property**

$=$ (_____) $\times$ _____ **Write _____ in scientific notation.**

$=$ _____ $\times$ (_____) **Associative property**

$=$ _____ **Product of powers property**

c. $\dfrac{3.5 \times 10^{-3}}{1.75 \times 10^{-5}}$

$= \dfrac{3.5}{1.75} \times \dfrac{10^{-3}}{10^{-5}}$ **Product rule for fractions**

$=$ ___ $\times$ _____ **Quotient of powers property**

✔ ***Checkpoint*** **Simplify the expression.**

3. $(2.01 \times 10^{-7})^{2}$

4. $\dfrac{4.8 \times 10^{-4}}{6 \times 10^{-4}}$

Homework