Section 4.R.5 **Scientific Notation**

Go to Section 4.R.5 Learn mode in Hawkes to follow along!

Writing Numbers in Scientific Notation

In scientific notation, decimal numbers are written as the product of a number _____

_____, and an _____ power of 10. For example,

$$250,000 = 2.5 \times 10^5$$ This is the same as multiplying by 100,000.

and $0.000000345 = 3.45 \times 10^{-7}.$ This is the same as dividing by 10,000,000.

The exponent tells us how many places the decimal point is to be moved and in what direction. If the exponent

is _____, the decimal is moved to the right. A negative exponent indicates that the decimal point

should move to the _____.

$$5.6 \times 10^4 = 5.6000.$$ 4 places to the right

$$4.9 \times 10^{-3} = 0.004.9$$ 3 places to the left

Scientific Notation

If N is a decimal number, then in scientific notation

_____

▶ **Example 1   Writing Decimals in Scientific Notation**

Write the following decimal numbers in scientific notation.

a. 8,720,000   **b.** 0.000000376

Solution

Exercises

Write the following numbers in scientific notation.

1. 927,000

3. 1,030,000,000

2. 0.0362

4. 0.0000009

Write the following numbers in decimal form.

5. 8.35×10^{-3}

6. 9.374×10^{7}

Scientific Notation and Simplifying Expressions

▶ **Example 2   Using Scientific Notation while Simplifying**

Simplify the following expressions by first writing the decimal numbers in scientific notation and then using the properties of exponents.

a. $\dfrac{(0.085)(41,000)}{0.00017}$

b. $\dfrac{(11,100)(0.064)}{(8,000,000)(370)}$

Solution

Exercises

First write each of the numbers in scientific notation. Then perform the indicated operations and leave your answer in scientific notation.

7. $0.000024 \cdot 40,000$

9. $\dfrac{0.005 \cdot 650 \cdot 3.3}{0.0011 \cdot 2500}$

8. $\dfrac{125}{50,000}$

10. $\dfrac{(1.1 \times 10^{4})(342 \times 10)}{(17.1 \times 10^{-11})(5.5 \times 10^{-14})}$

▶ Example 3   Application: Scientific Notation

Light travels approximately 3×10^8 meters per second. How many meters per minute does light travel?

Solution

Exercises

Solve.

11. One light-year is approximately 9.46×10^{15} meters. The distance to a certain star is 4.3 light-years. How many meters is this?

12. An ounce of gold contains 5×10^{22} atoms. All the gold ever taken out of the earth is estimated to be 3.0×10^{31} atoms. How many ounces of gold is this?