

Exponents and Polynomials

9



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SECTION 9.6

Multiplication and Division with Scientific Notation

Objective

- A** Multiply and divide numbers written in scientific notation.



A Multiplication and Division with Numbers
Written in Scientific Notation

Multiplication and Division with Numbers Written in Scientific Notation

In this section, we extend our work with scientific notation to include multiplication and division with numbers written in scientific notation.

To work the problems in this section, we use the commutative and associative properties of multiplication and the rule for multiplication with fractions.

Example 3

Find the product of 130,000,000 and 0.000005. Write your answer in scientific notation.

Solution:

We begin by writing both numbers in scientific notation.

Then we group the numbers between 1 and 10 separately from the powers of 10.

$$\begin{aligned}(130,000,000)(0.000005) &= (1.3 \times 10^8)(5 \times 10^{-6}) \\ &= (1.3)(5) \times (10^8)(10^{-6}) \\ &= 6.5 \times 10^2\end{aligned}$$

Example 4

Divide $\frac{39x^2y^3}{3xy^5}$.

Solution:

$$\frac{39x^2y^3}{3xy^5} = \frac{39}{3} \cdot \frac{x^2}{x} \cdot \frac{y^3}{y^5}$$

Write as separate fractions.

$$= 13x \cdot \frac{1}{y^2}$$

Divide coefficients, subtract exponents.

$$= \frac{13x}{y^2}$$

Write answer as a single fraction.

Example 8

Simplify: $\frac{(35,000)(0.0045)}{7,500,000}$.

Solution:

We write each number in scientific notation, and then we write the problem as two separate fractions in order to group the numbers between 1 and 10 together, as well as the powers of 10.

$$\frac{(35,000)(0.0045)}{7,500,000} = \frac{(3.5 \times 10^4)(4.5 \times 10^{-3})}{7.5 \times 10^6}$$

Example 8 – *Solution*

cont'd

$$= \frac{(3.5)(4.5)}{7.5} \times \frac{(10^4)(10^{-3})}{10^6}$$

$$= 2.1 \times 10^{4+(-3)-6}$$

$$= 2.1 \times 10^{-5}$$