

An Application of Exponents: Scientific Notation

Many numbers in science, engineering, and medical fields are either very large or very small. For example, the recommended dietary allowance of vitamin B₁₂ is about 0.000002 grams. Instead, we can write this as 2×10^{-6} grams (though often people use μg , which is read “micrograms”).

A number is written in **scientific notation** when it is expressed in the form:

$$a \times 10^n$$

where $1 \leq |a| < 10$ and n is an integer.

Ex 1.

Write each number without exponents.

$$1.2 \times 10^3$$

$$9.165 \times 10^6$$

$$4.09 \times 10^{-3}$$

Ex 2.

Write each number in scientific notation.

34,000,000

83,500,000,000

0.0000458

Ex 3.

Perform each calculation.

$$(7 \times 10^3)(8 \times 10^6)$$

$$\frac{4 \times 10^{-5}}{2 \times 10^3}$$

Practice

1. Write the following number without exponents.

$$7.349 \times 10^{-6}$$

2. Write each number in scientific notation.

a) -0.00000009478 b) $10,008,000,000,000$

3. Perform each calculation.

a) $(3 \times 10^{-4})(9 \times 10^{13})$ b) $\frac{3 \times 10^3}{6 \times 10^{-7}}$

Q: What has many keys but can't open any doors?