Math for Science

Science 10

Scientific Notation

Easy way to read very big and very small numbers

Examples:

A positive exponent is a big number:

$3.54 \times 10^5 = 354\ 000$

A negative exponent is a small number:

$2.31 \times 10^{-3} = 0.00231$

Converting to Scientific Notation

1. Place decimal so there is **one non-zero digit on the left**. Get rid of extra zeros.
2. Count spaces the decimal moved to get exponent on the 10.
   - Moves **left**, **positive** exponent (big number)
   - Moves **right**, **negative** exponent (little number)

Example 1: Scientific Notation

3 346 000 000

1. Write as a decimal with no extra zeros:
2. Find the exponent on the 10:
3. Write the number in scientific notation

Example 2: Scientific Notation

0.000 002 340

1. Write as a decimal with no extra zeros:
2. Find the exponent on the 10:
3. Write the number in scientific notation:

Converting to Standard Form

Multiply two terms together.

This can also be used to check the original conversion.

Example

Expand to standard form:

a. 4.87×10^{-4}

b. 2.99×10^{5}

Comparing Values

Numbers with **higher** exponents on the 10 are greater:

$10 > 3 \qquad -1 < 4 \qquad -5 < -2$

For numbers with the **same** exponent, numbers with a **larger decimal value** are greater:

$6.43 \times 10^{5} > 2.17 \times 10^{5}$

$1 \times 10^{-2} < 3 \times 10^{-2}$

Example

Which is bigger?

a. 5.10×10^{-4} or 4.10×10^{4}

b. 2.0×10^{4} or 3.0×10^{6}

c. 1.68×10^{-2} or 2.88×10^{-7}

d. 6.75×10^{-6} or 8.21×10^{-6}

e. 1.86×10^{5} or 2.12×10^{5}

Dimensional Analysis

- Tool for converting units OR for solving problems using units
- Each "conversion factor" is a fraction

Example:

$$15\ cm \times \frac{1m}{100\ cm} = 0.15\ m$$

Common Conversions

- 1 h = 60 min = 3600 s
- 1 min = 60 s
- 1 km = 1000 m (1 kg = 1000 g)
- 1 m = 100 cm = 1000 mm (1 L = 1000 mL)
- 1 cm = 10 mm
- 1 cm^3 = 1 mL

Example 1: Dimensional Analysis

Convert 1.78 kg to g.

Example 2: Dimensional Analysis

Convert 15 mm to km. Express your answer in scientific notation.

Example 3: Dimensional Analysis

Convert 33 min to:

a. h

b. s

Example 4: Dimensional Analysis

Convert 0.452 kg/L to:

a. g/L

b. g/mL

Example 5: Dimensional Analysis

Convert 120 km/h to m/s.