Scientific Notation

In scientific notation, numbers are expressed in the form **N × 10^n**, where **N** is a number between 1 and 10, and **n** is an exponent, which can be positive or negative.
Example:

- 232.508 = **2.32508 × 10^2** in scientific notation.

Calculations in Scientific Notation:

1. **Multiplication and Division**: Multiply or divide the coefficients, then add or subtract the exponents.

$$(a)\ (5.7 \times 10^6) \times (4.2 \times 10^5) = (5.7 \times 4.2)\ (10^{6+5}) = 23.94 \times 10^{11}$$

$$(b)\ (5.7 \times 10^6) \div (4.2 \times 10^3)$$

$$\frac{5.7 \times 10^6}{4.2 \times 10^3} = \frac{5.7}{4.2} \times 10^{6-3} = 1.357 \times 10^3$$

2. **Addition and Subtraction**: Adjust the numbers so they have the same exponent, then add or subtract the coefficients.

$$(a)\ 4.56 \times 10^3 + 2.62 \times 10^2$$
$$= 45.6 \times 10^2 + 2.62 \times 10^2$$
$$= (45.6 + 2.62) \times 10^2$$
$$= 48.22 \times 10^2$$

$$(b)\ 4.5 \times 10^{-3} - 2.6 \times 10^{-4}$$
$$= 4.5 \times 10^{-3} - 0.26 \times 10^{-3}$$
$$= (4.5 - 0.26) \times 10^{-3}$$
$$= 4.24 \times 10^{-3}$$

Significant Figures

Significant figures represent the digits that carry meaning and contribute to the precision of a measurement. Here are the rules:

1. **All non-zero digits are significant**.
   Example: 285 cm has **3 significant figures**.
2. **Leading zeros are not significant**.
   Example: 0.03 has **1 significant figure**.
3. **Zeros between non-zero digits are significant**.
   Example: 2.005 has **4 significant figures**.
4. **Trailing zeros are significant if they are after a decimal point**.
   Example: 0.200 g has **3 significant figures**.
5. **Exact numbers have infinite significant figures**.
   Example: 2 = 2.000000 or 20 = 20.000000 (infinite significant figures).

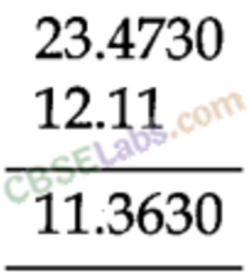
Operations with Significant Figures:

Addition and Subtraction:

- The final result should be reported with the same number of decimal places as the number with the least decimal places. *Example*:
  Adding 3.52, 2.3, and 6.24 gives **12.0** (reported to one decimal place).

Multiplication and Division:

- The result should be reported with the same number of significant figures as the least precise number. *Example*:
  Multiplying 2.2120 × 0.011 gives **0.024** (reported to two significant figures).



Dimensional Analysis

This is a method used to convert units from one system to another, also known as the **factor label method** or **unit factor method**. It involves multiplying by conversion factors to switch between units.