

Physics - Units and Dimensions

Topics : [Computer engineering](#)

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1. Introduction:

- Units and dimensions are fundamental concepts in physics used to measure physical quantities and describe the relationships between them.

2. Physical Quantity:

- A physical quantity is a property of a phenomenon, body, or substance that can be quantified and expressed numerically.
- Examples include length, mass, time, temperature, and electric charge.

3. Units:

- Units are standardized quantities used to express measurements of physical quantities.
- For example, the SI (International System of Units) unit of length is the meter (m), and the SI unit of mass is the kilogram (kg).
- Units provide a common language for scientists and engineers to communicate measurements and results.

4. Dimensions:

- Dimensions represent the nature or type of a physical quantity, such as length, mass, time, etc.
- Each physical quantity can be expressed in terms of fundamental dimensions.
- The fundamental dimensions are typically length (L), mass (M), time (T), electric current (I), temperature (Θ), amount of substance (N), and luminous intensity (J).

5. Dimensional Analysis:

- Dimensional analysis is a technique used to check the consistency of equations and derive relationships between physical quantities.
- In dimensional analysis, physical quantities are treated as algebraic quantities with dimensions.
- Equations must be dimensionally consistent, meaning that the dimensions of each term on both sides of the equation must be the same.

6. Dimensional Homogeneity:

- In a dimensionally homogeneous equation, each term has the same dimensions.
- This property ensures that the equation is physically meaningful and can be used to

derive relationships between physical quantities.

7. Dimensionless Quantities:

- Some quantities are dimensionless, meaning they do not have any physical dimensions.
- Examples include pure numbers (e.g., π), angles (measured in radians), and certain ratios (e.g., coefficient of friction).

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