The first lecture

**Physical units**

**Physical units**: They are the tools that are used to measure any physical quantity, and they are accompanied by a mathematical number that represents the amount of the quantity and describes it. These quantities represent area, mass, force, energy, time, speed, pressure, and others.

 **The basic quantities in physics** **are length, mass, and time**. The rest of the quantities are derived from it, such as area, volume, force, pressure, etc. Basic quantities are measured in units (**meter, kilogram, second**) (**MKS**) and its parts and multiples. The system that includes them is called the International System of Units (**ISU**), and there is another system of units of measurement called the English system (foot - pound - second).

**Table of parts and multiples of units**

|  |  |  |
| --- | --- | --- |
| Unit | Symbol | Math. formula |
| Tera | T | 1012 |
| Giga | G | 109 |
| Mega | M | 106 |
| Kilo | K | 103 |
| Hecto | H | 102 |
| Deca | Da | 10 |
| Deci | D | 10-1 |
| Centi | C | 10-2 |
| milli | Mm | 10-3 |
| Micro | M | 10-6 |
| nano | N | 10-9 |
| pico | P | 10-12 |
| femto | F | 10-15 |
| ato | A | 10-18 |

**Basic units of measurement**

|  |  |  |
| --- | --- | --- |
|  **The quantity** | **Unit in the international system (ISU)** | **Unity with the British system (FBS)** |
| Mass | kilogram (kg) | Pound (P)  |
| Length | meter (M) | Feet (F) |
| Time | second (S) | second (S) |

**Derived units of measurement**

|  |  |  |
| --- | --- | --- |
| **The quantity** | **Unit in the international system (ISU)** | **Unity with the British system (FBS)** |
|  Area |  Meter2 | Feet2 |
| Volume | Meter3 | Feet3 |
| Density = mass/ Volume | kilogram (kg)/ Meter3 | lbs/ft3 |
| Force | Newton(N) =kg.m/s2 | Weight Pound (LB) |
| Pressure = force / area | (Pascal ) N/m2 | lbs/ft2 |

**Table of quantity and its dimensions**

|  |  |  |  |
| --- | --- | --- | --- |
| **quantity** | **dimensions** | **Simple**  | **Unit**  |
| Area (A) | Length x width  | L x L = L2 | m2 |
| Volume(V)  | Length x width x height  | L x L x L = L3 | m3 |
| Density(ρ) | Mass / volume | M /L3 | Kg/m3 |
| Velocity (ν) | Distance\ time | L/T | m /s |
| Acceleration(a) | Velocity/ time | ν / T | m/s2 |
| Force (F) | Mass x Acceleration | M x a | N |