The Metric System of Measurements

Base Units

Meter (m) for length: The length of the path traveled by light in a vacuum during a time interval of 1/299,792,458 of a second.

Kilogram (kg) for mass: Equal to the mass of the international prototype of the kilogram.

Second (s) for time: The duration of 9,192,631,770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom.

Ampere (A) for electric current: A constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 meter apart in a vacuum, would produce between these conductors a force equal to 2 x 10^{-7} neweton per meter of length.

Kelvin (K) for thermodynamic temperature: The fraction 1/273.16 of the thermodynamic temperature of the triple point of water.

Candela (cd) for luminous intensity: A source that emits monochromatic radiation of frequency 540 x 1012 hertz and that has a radiant intensity in that direction of 1/683 watt per steradian.

Mole (mol) for quantity of matter: The amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilogram of carbon 12.

Non-SI Units Commonly Used

Ångström (Å) for measure of displacement: Equal to 0.0000000001 meter (10^{-10} m). Used to express wavelengths of visible light, UV light, gamma rays, and x-rays.

Liter (L) for volume: Equal to 1000 cm3.
## SI Derived Units

<table>
<thead>
<tr>
<th>Derived Quantity</th>
<th>Name</th>
<th>Symbol</th>
<th>Expression in Terms of Other SI Units</th>
<th>Expression in Terms of SI Base Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>plane angle</td>
<td>radian</td>
<td>rad</td>
<td>-</td>
<td>m⋅m⁻¹=1</td>
</tr>
<tr>
<td>solid angle</td>
<td>steradian</td>
<td>sr</td>
<td>-</td>
<td>m²⋅m²=1</td>
</tr>
<tr>
<td>frequency</td>
<td>hertz</td>
<td>Hz</td>
<td>-</td>
<td>s⁻¹</td>
</tr>
<tr>
<td>force</td>
<td>newton</td>
<td>N</td>
<td>-</td>
<td>m⋅kg⋅s⁻²</td>
</tr>
<tr>
<td>pressure, stress</td>
<td>pascal</td>
<td>Pa</td>
<td>N/m²</td>
<td>m⁻¹⋅kg⋅s⁻²</td>
</tr>
<tr>
<td>energy, work, quantity of heat</td>
<td>joule</td>
<td>J</td>
<td>Nm</td>
<td>m²⋅kg⋅s⁻²</td>
</tr>
<tr>
<td>power, radiant flux</td>
<td>watt</td>
<td>W</td>
<td>J/s</td>
<td>m²⋅kg⋅s⁻³</td>
</tr>
<tr>
<td>electric charge, quantity of</td>
<td>coulomb</td>
<td>C</td>
<td>-</td>
<td>s⋅A</td>
</tr>
<tr>
<td>electricity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>electric potential, difference,</td>
<td>volt</td>
<td>V</td>
<td>W/A</td>
<td>m²⋅kg⋅s⁻³⋅A⁻¹</td>
</tr>
<tr>
<td>electromotive force</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>capacitance</td>
<td>farad</td>
<td>F</td>
<td>C/V</td>
<td>m⁻²⋅kg⁻¹⋅s⁴⋅A²</td>
</tr>
<tr>
<td>electric conductance</td>
<td>siemens</td>
<td>S</td>
<td>A/V</td>
<td>m⁻²⋅kg⁻¹⋅s³⋅A²</td>
</tr>
<tr>
<td>electric resistance</td>
<td>ohm</td>
<td>Ω</td>
<td>V/A</td>
<td>m²⋅kg⋅s⁻³⋅A⁻²</td>
</tr>
<tr>
<td>magnetic flux</td>
<td>weber</td>
<td>Wb</td>
<td>Vs</td>
<td>m²⋅kg⋅s⁻²⋅A⁻¹</td>
</tr>
<tr>
<td>magnetic flux density</td>
<td>tesla</td>
<td>T</td>
<td>Wb/m²</td>
<td>kg⋅s⁻²⋅A⁻¹</td>
</tr>
<tr>
<td>inductance</td>
<td>henry</td>
<td>H</td>
<td>Wb/A</td>
<td>m²⋅kg⋅s⁻²⋅A⁻²</td>
</tr>
<tr>
<td>Celsius temperature</td>
<td>degree Celsius</td>
<td>°C</td>
<td>-</td>
<td>K</td>
</tr>
<tr>
<td>luminous flux</td>
<td>lumen</td>
<td>lm</td>
<td>cd⋅sr</td>
<td>m²⋅m²⋅cd = cd</td>
</tr>
<tr>
<td>illuminance</td>
<td>lux</td>
<td>lx</td>
<td>lm/m²</td>
<td>m²⋅m⁻²⋅cd = m²⋅cd</td>
</tr>
<tr>
<td>activity (of a radionuclide)</td>
<td>becquerel</td>
<td>Bq</td>
<td>-</td>
<td>s⁻¹</td>
</tr>
<tr>
<td>absorbed dose, specific energy</td>
<td>gray</td>
<td>Gy</td>
<td>J/kg</td>
<td>m²⋅s⁻²</td>
</tr>
<tr>
<td>(impacted), kerma</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dose equivalent</td>
<td>sievert</td>
<td>Sv</td>
<td>J/kg</td>
<td>m²⋅s⁻²</td>
</tr>
<tr>
<td>catalytic activity</td>
<td>katal</td>
<td>kat</td>
<td>-</td>
<td>s⁻¹·mol</td>
</tr>
</tbody>
</table>
## SI Prefixes

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Symbol</th>
<th>Factor</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>yocto</td>
<td>y</td>
<td>$10^{-24}$</td>
<td>.000000000000000000000001</td>
</tr>
<tr>
<td>zepto</td>
<td>z</td>
<td>$10^{-21}$</td>
<td>.00000000000000000000001</td>
</tr>
<tr>
<td>atto</td>
<td>a</td>
<td>$10^{-18}$</td>
<td>.00000000000000000001</td>
</tr>
<tr>
<td>femto</td>
<td>f</td>
<td>$10^{-15}$</td>
<td>.000000000000001</td>
</tr>
<tr>
<td>pico</td>
<td>p</td>
<td>$10^{-12}$</td>
<td>.000000001</td>
</tr>
<tr>
<td>nano</td>
<td>n</td>
<td>$10^{-9}$</td>
<td>.0000001</td>
</tr>
<tr>
<td>micro</td>
<td>µ</td>
<td>$10^{-6}$</td>
<td>.001</td>
</tr>
<tr>
<td>milli</td>
<td>m</td>
<td>$10^{-3}$</td>
<td>.1</td>
</tr>
<tr>
<td>centi</td>
<td>c</td>
<td>$10^{-2}$</td>
<td>.1</td>
</tr>
<tr>
<td>deci</td>
<td>d</td>
<td>$10^{-1}$</td>
<td>1</td>
</tr>
<tr>
<td><strong>base unit</strong></td>
<td></td>
<td></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>deca</td>
<td>da</td>
<td>$10^{1}$</td>
<td>10</td>
</tr>
<tr>
<td>hecto</td>
<td>h</td>
<td>$10^{2}$</td>
<td>100</td>
</tr>
<tr>
<td>kilo</td>
<td>k</td>
<td>$10^{3}$</td>
<td>1000</td>
</tr>
<tr>
<td>mega</td>
<td>M</td>
<td>$10^{6}$</td>
<td>1000000</td>
</tr>
<tr>
<td>giga</td>
<td>G</td>
<td>$10^{9}$</td>
<td>1000000000</td>
</tr>
<tr>
<td>tera</td>
<td>T</td>
<td>$10^{12}$</td>
<td>1000000000000</td>
</tr>
<tr>
<td>peta</td>
<td>P</td>
<td>$10^{15}$</td>
<td>1000000000000000</td>
</tr>
<tr>
<td>exa</td>
<td>E</td>
<td>$10^{18}$</td>
<td>10000000000000000000</td>
</tr>
<tr>
<td>zetta</td>
<td>Z</td>
<td>$10^{21}$</td>
<td>1000000000000000000000</td>
</tr>
<tr>
<td>yotta</td>
<td>Y</td>
<td>$10^{24}$</td>
<td>1000000000000000000000000</td>
</tr>
</tbody>
</table>