Conversion of units

Conversion of units refers to conversion factors between different units of measurement for the same quantity.

Techniques

Process

The process of conversion depends on the specific situation and the intended purpose. This may be governed by regulation, contract, Technical specifications or other published standards. Engineering judgment may include such factors as:

- The precision and accuracy of measurement and the associated uncertainty of measurement
- The statistical confidence interval or tolerance interval of the initial measurement
- The number of significant figures of the measurement
- The intended use of the measurement including the engineering tolerances

Some conversions from one system of units to another need to be exact, without increasing or decreasing the precision of the first measurement. This is sometimes called soft conversion. It does not involve changing the physical configuration of the item being measured.

By contrast, a hard conversion or an adaptive conversion may not be exactly equivalent. It changes the measurement to convenient and workable numbers and units in the new system. It sometimes involves a slightly different configuration, or size substitution, of the item.

Multiplication Factors

Conversion between units in the metric (SI) system can be discerned by their prefixes (for example, 1 kilogram = 1000 grams, 1 milligram = 0.001 grams) and are thus not listed in this article. Exceptions are made if the unit is commonly known by another name (for example, 1 micron = 10^{-6} metre). For a full listing of multiplication factors, see SI prefix.

Table Ordering

Within each table, the units are listed alphabetically, and the SI units (base or derived) are highlighted.

Tables of conversion factors

This article gives lists of conversion factors for each of a number of physical quantities, which are listed in the index. For each physical quantity, a number of different units (some only of historical interest) are shown and expressed in terms of the corresponding SI unit.
### Legend

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>≡</td>
<td>exactly equal to</td>
</tr>
<tr>
<td>≈</td>
<td>approximately equal to</td>
</tr>
<tr>
<td>digits</td>
<td>indicates that digits repeat infinitely (e.g. 8.294 369 corresponds to 8.294 369 369 369….)</td>
</tr>
<tr>
<td>(H)</td>
<td>of chiefly historical interest</td>
</tr>
</tbody>
</table>

### Length

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ångström</td>
<td>Å</td>
<td>(1 \times 10^{-10}) m</td>
<td>≈ 0.1 nm</td>
</tr>
<tr>
<td>astronomical unit</td>
<td>AU</td>
<td>Distance from Earth to Sun</td>
<td>≈ 149 597 871 464 m [1]</td>
</tr>
<tr>
<td>barleycorn (H)</td>
<td></td>
<td>(= \frac{1}{8} ) in (see note above about rounding)</td>
<td>≈ 8.46 \times 10^{-3} m</td>
</tr>
<tr>
<td>bohr, atomic unit of length</td>
<td>(a_0)</td>
<td>Bohr radius of hydrogen</td>
<td>≈ 5.291 772 0859 \times 10^{-11} \pm 3.6 \times 10^{-20} m [2]</td>
</tr>
<tr>
<td>cable length (Imperial)</td>
<td></td>
<td>≈ 608 ft</td>
<td>≈ 185.3184 m</td>
</tr>
<tr>
<td>cable length (International)</td>
<td></td>
<td>(= 1/10) nmi</td>
<td>≈ 185.2 m</td>
</tr>
<tr>
<td>cable length (U.S.)</td>
<td></td>
<td>(= 720) ft</td>
<td>≈ 219.456 m</td>
</tr>
<tr>
<td>chain (Gunter's; Surveyor's)</td>
<td>ch</td>
<td>(= 66) ft(US) (= 4) rods [3]</td>
<td>≈ 20.116 84 m</td>
</tr>
<tr>
<td>cubit (H)</td>
<td></td>
<td>Distance from fingers to elbow (= 18) in</td>
<td>≈ 0.5 m</td>
</tr>
<tr>
<td>ell (H)</td>
<td>ell</td>
<td>(= 45) in [4] (In England usually)</td>
<td>≈ 1.143 m</td>
</tr>
<tr>
<td>fathom</td>
<td>fm</td>
<td>(= 6) ft [4]</td>
<td>≈ 1.8288 m</td>
</tr>
<tr>
<td>fermi</td>
<td>fm</td>
<td>(1 \times 10^{-15}) m [4]</td>
<td>(= 1 \times 10^{-15}) m</td>
</tr>
<tr>
<td>finger</td>
<td></td>
<td>(= 7/8) in</td>
<td>(= 0.022 225) m</td>
</tr>
<tr>
<td>finger (cloth)</td>
<td></td>
<td>(= 4/5) in</td>
<td>(= 0.1143) m</td>
</tr>
<tr>
<td>foot (Benoît) (H)</td>
<td>ft (Ben)</td>
<td></td>
<td>≈ 0.304 799 735 m</td>
</tr>
<tr>
<td>foot (Clarke's; Cape) (H)</td>
<td>ft (Cla)</td>
<td></td>
<td>≈ 0.304 797 2654 m</td>
</tr>
<tr>
<td>foot (Indian) (H)</td>
<td>ft Ind</td>
<td></td>
<td>≈ 0.304 799 514 m</td>
</tr>
<tr>
<td>foot (International)</td>
<td>ft</td>
<td>(= \frac{1}{3}) yd (= 0.3048) m (= 12) inches</td>
<td>≈ 0.3048 m</td>
</tr>
<tr>
<td>foot (Sear's) (H)</td>
<td>ft (Sear)</td>
<td></td>
<td>≈ 0.304 799 47 m</td>
</tr>
<tr>
<td>foot (U.S. Survey)</td>
<td>ft (US)</td>
<td>(= 1200/3937) m [5]</td>
<td>≈ 0.304 800 610 m</td>
</tr>
<tr>
<td>french; charriere</td>
<td>F</td>
<td>(= \frac{1}{5}) mm</td>
<td>(= 3.3 \times 10^{-4}) m</td>
</tr>
<tr>
<td>furlong</td>
<td>fur</td>
<td>(= 10) chains (= 660) ft (= 220) yd [4]</td>
<td>≈ 201.168 m</td>
</tr>
<tr>
<td>hand</td>
<td></td>
<td>(= 4) in [4]</td>
<td>(= 0.1016) m</td>
</tr>
<tr>
<td>Unit</td>
<td>Symbol</td>
<td>Conversion</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Inch (International)</td>
<td>in</td>
<td>= 1/36 yd = 1/12 ft ≡ 0.0254 m</td>
<td></td>
</tr>
<tr>
<td>League (land)</td>
<td>lea</td>
<td>≡ 3 US Statute miles [3] ≡ 4 828.032 m</td>
<td></td>
</tr>
<tr>
<td>Light-day</td>
<td></td>
<td>≡ 24 light-hours ≡ 2.590 206 837 12 × 10(^{13}) m</td>
<td></td>
</tr>
<tr>
<td>Light-hour</td>
<td></td>
<td>≡ 60 light-minutes ≡ 1.079 252 8488 × 10(^{12}) m</td>
<td></td>
</tr>
<tr>
<td>Light-minute</td>
<td></td>
<td>≡ 60 light-seconds ≡ 1.798 754 748 × 10(^{10}) m</td>
<td></td>
</tr>
<tr>
<td>Light-second</td>
<td></td>
<td>≡ Distance light travels in one second in vacuum ≡ 299 792 458 m</td>
<td></td>
</tr>
<tr>
<td>Light-year</td>
<td>l.y.</td>
<td>≡ Distance light travels in vacuum in 365.25 days [6] ≡ 9.460 730 472 5808 × 10(^{15}) m</td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td>ln</td>
<td>= 1/12 in [7] ≡ 0.002 116 m</td>
<td></td>
</tr>
<tr>
<td>Link (Gunter's; Surveyor's)</td>
<td>lnk</td>
<td>≡ 1/100 ch [4] = 0.66 ft = 7.92in ≡ 0.201 168 m</td>
<td></td>
</tr>
<tr>
<td>Link (Ramsden's; Engineer's)</td>
<td>lnk</td>
<td>= 1 ft [4] ≡ 0.3048 m</td>
<td></td>
</tr>
<tr>
<td>Metre (SI base unit)</td>
<td>m</td>
<td>= Distance light travels in 1/299 792 458 of a second in vacuum, ≡ distance from equator to pole/10 000 000 ≡ 1 m</td>
<td></td>
</tr>
<tr>
<td>Mickey</td>
<td>pt</td>
<td>= 1/200 in ≡ 1.27 × 10(^{-4}) m</td>
<td></td>
</tr>
<tr>
<td>Micron</td>
<td>µ</td>
<td>≡ 1 × 10(^{-6}) m</td>
<td></td>
</tr>
<tr>
<td>Mill; Thou</td>
<td>mil</td>
<td>= 1 × 10(^{-3}) in ≡ 2.54 × 10(^{-5}) m</td>
<td></td>
</tr>
<tr>
<td>Mill (Sweden and Norway)</td>
<td>mil</td>
<td>= 10 km ≡ 10 000 m</td>
<td></td>
</tr>
<tr>
<td>Mile (geographical) (H)</td>
<td></td>
<td>= 6082 ft ≡ 1 853.7936 m</td>
<td></td>
</tr>
<tr>
<td>Mile (international)</td>
<td>mi</td>
<td>≡ 80 chains ≡ 5280 ft ≡ 1760 yd ≡ 1 609.344 m</td>
<td></td>
</tr>
<tr>
<td>Mile (tactical or data)</td>
<td></td>
<td>= 6000 ft ≡ 1828.8 m</td>
<td></td>
</tr>
<tr>
<td>Mile (telegraph) (H)</td>
<td>mi</td>
<td>= 6087 ft ≡ 1 855.3176 m</td>
<td></td>
</tr>
<tr>
<td>Mile (U.S. Survey)</td>
<td>mi</td>
<td>= 5280 ft (US Survey feet) = (5280 × 1200/3937) m ≡ 1 609.347 219 m</td>
<td></td>
</tr>
<tr>
<td>Nail (cloth)</td>
<td></td>
<td>= 2¼ in [4] ≡ 0.057 15 m</td>
<td></td>
</tr>
<tr>
<td>Nautical league</td>
<td>NL; nl</td>
<td>= 3 nmi [4] ≡ 5 556 m</td>
<td></td>
</tr>
<tr>
<td>Nautical mile (Admiralty)</td>
<td>NM (Adm); nmi (Adm)</td>
<td>= 6080 ft ≡ 1 853.184 m</td>
<td></td>
</tr>
<tr>
<td>Nautical mile (international)</td>
<td>NM; nmi</td>
<td>= 1852 m [9] ≡ 1852 m</td>
<td></td>
</tr>
<tr>
<td>Nautical mile (US pre 1954)</td>
<td></td>
<td>= 1853.248 m ≡ 1853.248 m</td>
<td></td>
</tr>
<tr>
<td>Pace</td>
<td></td>
<td>= 2.5 ft [4] ≡ 0.762 m</td>
<td></td>
</tr>
<tr>
<td>Palm</td>
<td></td>
<td>= 3 in [4] ≡ 0.0762 m</td>
<td></td>
</tr>
<tr>
<td>Parsec</td>
<td>pc</td>
<td>Distance of star with parallax shift of one arc second from a base of one astronomical unit ≡ 3.085 677 82 × 10(^{16}) ± 6 × 10(^{9}) m</td>
<td></td>
</tr>
<tr>
<td>Pica</td>
<td></td>
<td>≡ 12 points Dependent on point measures.</td>
<td></td>
</tr>
<tr>
<td>Point (American, English)</td>
<td>pt</td>
<td>= 1/72.272 in ≡ 0.000 351 450 m</td>
<td></td>
</tr>
</tbody>
</table>
### Conversion of units

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>point (Didot; European)</td>
<td>pt</td>
<td>= 1/12 × 1/72 of pied du roi; After 1878: = 3/133 cm</td>
<td>≈ 0.000 375 97 m; After 1878: ≈ 0.000 375 939 85 m</td>
</tr>
<tr>
<td>point (PostScript)</td>
<td>pt</td>
<td>= 1/72 in</td>
<td>≈ 0.000 352 7 m</td>
</tr>
<tr>
<td>point (TeX)</td>
<td>pt</td>
<td>= 1/72.27 in</td>
<td>≈ 0.000 351 4598 m</td>
</tr>
<tr>
<td>quarter</td>
<td></td>
<td>= ¼ yd</td>
<td>≈ 0.2286 m</td>
</tr>
<tr>
<td>rod; pole; perch (H)</td>
<td>rd</td>
<td>= 16½ ft</td>
<td>≈ 5.0292 m</td>
</tr>
<tr>
<td>rope (H)</td>
<td>rope</td>
<td>= 20 ft</td>
<td>≈ 6.096 m</td>
</tr>
<tr>
<td>span (H)</td>
<td></td>
<td>= 9 in</td>
<td>≈ 0.2286 m</td>
</tr>
<tr>
<td>spat</td>
<td></td>
<td>= 1 × 10⁻¹² m</td>
<td></td>
</tr>
<tr>
<td>stick (H)</td>
<td></td>
<td>= 2 in</td>
<td>≈ 0.0508 m</td>
</tr>
<tr>
<td>stigma; bicron (picometre)</td>
<td>pm</td>
<td></td>
<td>= 1 × 10⁻¹² m</td>
</tr>
<tr>
<td>twip</td>
<td>twp</td>
<td>= 1/1440 in</td>
<td>≈ 1.7638 × 10⁻⁵ m</td>
</tr>
<tr>
<td>x unit; siegbahn</td>
<td>xu</td>
<td></td>
<td>≈ 1.0021 × 10⁻¹³ m</td>
</tr>
<tr>
<td>yard (International)</td>
<td>yd</td>
<td>= 0.9144 m</td>
<td>≈ 3 ft = 36 in</td>
</tr>
</tbody>
</table>

### Area

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>acre (international)</td>
<td>ac</td>
<td>= 1 ch × 10 ch = 4840 sq yd</td>
<td>= 4 046.856 4224 m²</td>
</tr>
<tr>
<td>acre (U. S. survey)</td>
<td>ac</td>
<td>= 10 sq ch = 4840 sq yd</td>
<td>≈ 4 046.873 m² [15]</td>
</tr>
<tr>
<td>are</td>
<td>a</td>
<td>= 100 m²</td>
<td>= 100 m²</td>
</tr>
<tr>
<td>barn</td>
<td>b</td>
<td>= 10⁻²⁸ m²</td>
<td>= 10⁻²⁸ m²</td>
</tr>
<tr>
<td>barony</td>
<td></td>
<td>= 4000 ac</td>
<td>≈ 1.618 742 × 10⁷ m²</td>
</tr>
<tr>
<td>board</td>
<td>bd</td>
<td>= 1 in × 1 ft</td>
<td>= 7.741 92 × 10⁻³ m²</td>
</tr>
<tr>
<td>boiler horsepower equivalent direct radiation</td>
<td>bhp EDR</td>
<td>= (1 ft²) (1 bhp) / (240 BTU/hr)</td>
<td>≈ 12.958 174 m²</td>
</tr>
<tr>
<td>circular inch</td>
<td>circ in</td>
<td>= π/4 sq in</td>
<td>≈ 5.067 075 × 10⁻⁴ m²</td>
</tr>
<tr>
<td>circular mil; circular thou</td>
<td>circ mil</td>
<td>= π/4 mil²</td>
<td>≈ 5.067 075 × 10⁻⁶ m²</td>
</tr>
<tr>
<td>cord</td>
<td></td>
<td>= 192 bd</td>
<td>= 1.486 448 64 m²</td>
</tr>
<tr>
<td>dunam</td>
<td></td>
<td>= 1 000 m²</td>
<td>= 1 000 m²</td>
</tr>
<tr>
<td>guntha</td>
<td></td>
<td>= 121 sq yd</td>
<td>≈ 101.17 m²</td>
</tr>
<tr>
<td>hectare</td>
<td>ha</td>
<td>= 10 000 m²</td>
<td>= 10 000 m²</td>
</tr>
<tr>
<td>hide</td>
<td></td>
<td>≈ 120 ac (variable)</td>
<td>≈ 5 × 10⁵ m²</td>
</tr>
<tr>
<td>Unit</td>
<td>Symbol</td>
<td>Conversion Factor</td>
<td>Conversion Factor (m²)</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------</td>
<td>-------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>rood</td>
<td>ro</td>
<td>≡ ¼ ac</td>
<td>1 011.714 1056 m²</td>
</tr>
<tr>
<td>section</td>
<td></td>
<td>≡ 1 mi × 1 mi</td>
<td>2.589 988 110 336 × 10⁶ m²</td>
</tr>
<tr>
<td>shed</td>
<td></td>
<td>≡ 10⁻²² m²</td>
<td>10⁻²² m²</td>
</tr>
<tr>
<td>square (roofing)</td>
<td></td>
<td>≡ 10 ft × 10 ft</td>
<td>9.290 304 m²</td>
</tr>
<tr>
<td>square chain (international)</td>
<td>sq ch</td>
<td>≡ 66 ft × 66 ft = 1/10 ac</td>
<td>404.685 642 24 m²</td>
</tr>
<tr>
<td>square chain (U.S. Survey)</td>
<td>sq ch</td>
<td>≡ 66 ft (US) × 66 ft (US) = 1/10 ac</td>
<td>404.687 3 m²</td>
</tr>
<tr>
<td>square foot</td>
<td>sq ft</td>
<td>≡ 1 ft × 1 ft</td>
<td>9.290 304 × 10⁻² m²</td>
</tr>
<tr>
<td>square foot (U.S. Survey)</td>
<td>sq ft</td>
<td>≡ 1 ft (US) × 1 ft (US)</td>
<td>9.290 341 161 327 49 × 10⁻² m²</td>
</tr>
<tr>
<td>square inch</td>
<td>sq in</td>
<td>≡ 1 in × 1 in</td>
<td>6.4516 × 10⁻⁴ m²</td>
</tr>
<tr>
<td>square kilometre</td>
<td>km²</td>
<td>≡ 1 km × 1 km</td>
<td>10⁶ m²</td>
</tr>
<tr>
<td>square link (Gunter's)(International)</td>
<td>sq lnk</td>
<td>≡ 1 lnk × 1 lnk = 0.66 ft × 0.66 ft</td>
<td>4.046 856 4224 × 10⁻² m²</td>
</tr>
<tr>
<td>square link (Gunter's)(US Survey)</td>
<td>sq lnk</td>
<td>≡ 1 lnk × 1 lnk = 0.66 ft (US) × 0.66 ft (US)</td>
<td>4.046 872 × 10⁻² m²</td>
</tr>
<tr>
<td>square link (Ramsden's)</td>
<td>sq lnk</td>
<td>≡ 1 lnk × 1 lnk = 1 ft × 1 ft</td>
<td>0.09290304 m²</td>
</tr>
<tr>
<td>square metre (SI unit)</td>
<td>m²</td>
<td>≡ 1 m × 1 m</td>
<td>1 m²</td>
</tr>
<tr>
<td>square mil; square thou</td>
<td>sq mil</td>
<td>≡ 1 mil × 1 mil</td>
<td>6.4516 × 10⁻⁴ m²</td>
</tr>
<tr>
<td>square mile</td>
<td>sq mi</td>
<td>≡ 1 mi × 1 mi</td>
<td>2.589 988 110 336 × 10⁶ m²</td>
</tr>
<tr>
<td>square mile (U.S. Survey)</td>
<td>sq mi</td>
<td>≡ 1 mi (US) × 1 mi (US)</td>
<td>2.589 998 47 × 10⁶ m²</td>
</tr>
<tr>
<td>square rod/pole/perch</td>
<td>sq rd</td>
<td>≡ 1 rd × 1 rd</td>
<td>25.292 852 64 m²</td>
</tr>
<tr>
<td>square yard (International)</td>
<td>sq yd</td>
<td>≡ 1 yd × 1 yd</td>
<td>0.836 127 36 m²</td>
</tr>
<tr>
<td>stremma</td>
<td></td>
<td></td>
<td>1 000 m²</td>
</tr>
<tr>
<td>township</td>
<td></td>
<td>≡ 36 sq mi (US)</td>
<td>9.323 994 × 10⁷ m²</td>
</tr>
<tr>
<td>yardland</td>
<td></td>
<td>≡ 30 ac</td>
<td>1.2 × 10⁵ m²</td>
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</tbody>
</table>
### Volume

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>acre-foot</td>
<td>ac ft</td>
<td>≡ 1 ac x 1 ft = 43 560 ft$^3$</td>
<td>≈ 1 233.481 837 547 52 m$^3$</td>
</tr>
<tr>
<td>acre-inch</td>
<td></td>
<td>≡ 1 ac x 1 in</td>
<td>≈ 102.790 153 128 96 m$^3$</td>
</tr>
<tr>
<td>barrel (Imperial)</td>
<td>bl (Imp)</td>
<td>≡ 36 gal (Imp)</td>
<td>≈ 0.163 659 24 m$^3$</td>
</tr>
<tr>
<td>barrel (petroleum)</td>
<td>bl; bbl</td>
<td>≡ 42 gal (US)</td>
<td>≈ 0.158 987 294 928 m$^3$</td>
</tr>
<tr>
<td>barrel (U.S. dry)</td>
<td>bl (US)</td>
<td>≡ 105 qt (US) = 105/32 bu (US lvl)</td>
<td>≈ 0.115 628 198 985 075 m$^3$</td>
</tr>
<tr>
<td>barrel (U.S. fluid)</td>
<td>fl bl (US)</td>
<td>≡ 31½ gal (US)</td>
<td>≈ 0.119 240 471 196 m$^3$</td>
</tr>
<tr>
<td>board-foot</td>
<td>fbm</td>
<td>≡ 144 cu in</td>
<td>≈ 2.359 737 216 × 10$^{-3}$ m$^3$</td>
</tr>
<tr>
<td>bucket (Imperial)</td>
<td>bkt</td>
<td>≡ 4 gal (Imp)</td>
<td>≈ 0.018 184 36 m$^3$</td>
</tr>
<tr>
<td>bushel (Imperial)</td>
<td>bu (Imp)</td>
<td>≡ 8 gal (Imp)</td>
<td>≈ 0.036 368 72 m$^3$</td>
</tr>
<tr>
<td>bushel (U.S. dry heaped)</td>
<td>bu (US)</td>
<td>≡ 1 ¼ bu (US lvl)</td>
<td>≈ 0.044 048 837 7086 m$^3$</td>
</tr>
<tr>
<td>bushel (U.S. dry level)</td>
<td>bu (US lvl)</td>
<td>≡ 2 150.42 cu in</td>
<td>≈ 0.035 239 070 166 88 m$^3$</td>
</tr>
<tr>
<td>butt, pipe</td>
<td></td>
<td>≡ 126 gal (wine)</td>
<td>≈ 0.476 961 884 784 m$^3$</td>
</tr>
<tr>
<td>coomb</td>
<td></td>
<td>≡ 4 bu (wine)</td>
<td>≈ 0.145 474 88 m$^3$</td>
</tr>
<tr>
<td>cord (firewood)</td>
<td></td>
<td>≡ 8 ft x 4 ft x 4 ft</td>
<td>≈ 3.624 556 363 776 m$^3$</td>
</tr>
<tr>
<td>cord-foot</td>
<td></td>
<td>≡ 16 cu ft</td>
<td>≈ 0.453 069 545 472 m$^3$</td>
</tr>
<tr>
<td>cubic fathom</td>
<td></td>
<td>≡ 1 fm x 1 fm x 1 fm</td>
<td>≈ 6.116 438 863 872 m$^3$</td>
</tr>
<tr>
<td>cubic foot</td>
<td>cu ft</td>
<td>≡ 1 ft x 1 ft x 1 ft</td>
<td>≈ 0.028 316 846 592 m$^3$</td>
</tr>
<tr>
<td>cubic inch</td>
<td>cu in</td>
<td>≡ 1 in x 1 in x 1 in</td>
<td>≈ 16.387 064 × 10$^{-6}$ m$^3$</td>
</tr>
<tr>
<td>cubic metre (SI unit)</td>
<td>m$^3$</td>
<td>≡ 1 m x 1 m x 1 m</td>
<td>≈ 1 m$^3$</td>
</tr>
<tr>
<td>cubic mile</td>
<td>cu mi</td>
<td>≡ 1 mi x 1 mi x 1 mi</td>
<td>≈ 4 168 181 825.440 579 584 m$^3$</td>
</tr>
<tr>
<td>cubic yard</td>
<td>cu yd</td>
<td>≡ 27 cu ft</td>
<td>≈ 0.764 554 857 984 m$^3$</td>
</tr>
<tr>
<td>cup (breakfast)</td>
<td></td>
<td>≡ 10 fl oz (Imp)</td>
<td>≈ 284.130 625 × 10$^{-6}$ m$^3$</td>
</tr>
<tr>
<td>cup (Canadian)</td>
<td>c (CA)</td>
<td>≡ 8 fl oz (Imp)</td>
<td>≈ 227.3045 × 10$^{-6}$ m$^3$</td>
</tr>
<tr>
<td>cup (metric)</td>
<td>c</td>
<td>≡ 250.0 × 10$^{-6}$ m$^3$</td>
<td>≈ 250.0 × 10$^{-6}$ m$^3$</td>
</tr>
<tr>
<td>cup (U.S. customary)</td>
<td>c (US)</td>
<td>≡ 8 US fl oz = 1/16 gal (US)</td>
<td>≈ 236.588 2365 × 10$^{-6}$ m$^3$</td>
</tr>
<tr>
<td>cup (U.S. food nutrition labeling)</td>
<td>c (US)</td>
<td>≡ 240 mL $^{[16]}$</td>
<td>≈ 2.4 × 10$^{-4}$ m$^3$</td>
</tr>
<tr>
<td>dash (Imperial)</td>
<td></td>
<td>≡ 1/384 gi (Imp) = ½ pinch (Imp)</td>
<td>≈ 369.961 751 302 08 3 × 10$^{-9}$ m$^3$</td>
</tr>
<tr>
<td>dash (U.S.)</td>
<td></td>
<td>≡ 1/96 US fl oz = ½ US pinch</td>
<td>≈ 308.057 599 609 375 × 10$^{-9}$ m$^3$</td>
</tr>
<tr>
<td>dessertspoon (Imperial)</td>
<td></td>
<td>≡ 1/12 gi (Imp)</td>
<td>≈ 11.838 776 0416 × 10$^{-9}$ m$^3$</td>
</tr>
<tr>
<td>drop (Imperial)</td>
<td>gtt</td>
<td>≡ 1/288 fl oz (Imp)</td>
<td>≈ 98.656 467 013 8 × 10$^{-9}$ m$^3$</td>
</tr>
</tbody>
</table>
### Conversion of Units

<table>
<thead>
<tr>
<th>Unit (Imperial) (alt)</th>
<th>Symbol</th>
<th>Conversion</th>
<th>Value [m³]</th>
</tr>
</thead>
<tbody>
<tr>
<td>drop</td>
<td>gtt</td>
<td>1/824 gi</td>
<td>7.786684 × 10⁻⁹</td>
</tr>
<tr>
<td>drop (medical)</td>
<td></td>
<td>1/12 ml</td>
<td>8.303 × 10⁻⁹</td>
</tr>
<tr>
<td>drop (metric)</td>
<td></td>
<td>1/20 mL</td>
<td>5.00 × 10⁻⁹</td>
</tr>
<tr>
<td>drop (U.S.) (alt)</td>
<td>gtt</td>
<td>1/360 US fl oz</td>
<td>8.214869322916 × 10⁻⁹</td>
</tr>
<tr>
<td>drop (U.S.)</td>
<td>gtt</td>
<td>1/456 US fl oz</td>
<td>6.854231 × 10⁻⁹</td>
</tr>
<tr>
<td>fifth</td>
<td></td>
<td>1/5 US gal</td>
<td>7.570823568 × 10⁻⁹</td>
</tr>
<tr>
<td>firkin</td>
<td></td>
<td>9 gal (US)</td>
<td>0.003068706056</td>
</tr>
<tr>
<td>fluid drachm (Imperial)</td>
<td>fl dr</td>
<td>1/6 fl oz (Imp)</td>
<td>3.5516328125 × 10⁻⁶</td>
</tr>
<tr>
<td>fluid dram (U.S.); U.S. fluidram</td>
<td>fl dr</td>
<td>1/6 US fl oz</td>
<td>3.6966911953125 × 10⁻⁶</td>
</tr>
<tr>
<td>fluid scruple (Imperial)</td>
<td>fl s</td>
<td>1/24 fl oz (Imp)</td>
<td>1.18387760416 × 10⁻⁶</td>
</tr>
<tr>
<td>gallon (beer)</td>
<td>beer gal</td>
<td>282 cu in</td>
<td>4.621152048 × 10⁻³</td>
</tr>
<tr>
<td>gallon (Imperial)</td>
<td>gal (Imp)</td>
<td>4.54609 L</td>
<td>4.54609 × 10⁻³</td>
</tr>
<tr>
<td>gallon (U.S. dry)</td>
<td>gal (US)</td>
<td>1/8 bu (US lvl)</td>
<td>4.40488377086 × 10⁻³</td>
</tr>
<tr>
<td>gallon (U.S. fluid; Wine)</td>
<td>gal (US)</td>
<td>231 cu in</td>
<td>3.785411784 × 10⁻³</td>
</tr>
<tr>
<td>gill (Imperial); Noggin</td>
<td>gi (Imp); nog</td>
<td>5 fl oz (Imp)</td>
<td>0.1420653125 × 10⁻³</td>
</tr>
<tr>
<td>gill (U.S.)</td>
<td>gi (US)</td>
<td>4 US fl oz</td>
<td>0.11829411825 × 10⁻³</td>
</tr>
<tr>
<td>hogshead (Imperial)</td>
<td>hhd (Imp)</td>
<td>2 bl (Imp)</td>
<td>0.3231848 × 10⁻³</td>
</tr>
<tr>
<td>hogshead (U.S.)</td>
<td>hhd (US)</td>
<td>2 fl bl (US)</td>
<td>0.238480942392</td>
</tr>
<tr>
<td>jigger (bartending)</td>
<td></td>
<td>1 1/2 US fl oz</td>
<td>4.436 × 10⁻⁶</td>
</tr>
<tr>
<td>kilderkin</td>
<td></td>
<td>18 gal (Imp)</td>
<td>0.08182962</td>
</tr>
<tr>
<td>lambda</td>
<td>λ</td>
<td>1 mm³</td>
<td>1 × 10⁻⁹</td>
</tr>
<tr>
<td>last</td>
<td></td>
<td>80 bu (Imp)</td>
<td>2.0904976</td>
</tr>
<tr>
<td>litre</td>
<td>L</td>
<td>1 dm³ [17]</td>
<td>0.001</td>
</tr>
<tr>
<td>load</td>
<td></td>
<td>50 cu ft</td>
<td>1.4158423296</td>
</tr>
<tr>
<td>minim (Imperial)</td>
<td>min</td>
<td>1/480 fl oz (Imp) = 1/60 fl dr (Imp)</td>
<td>59.1938802083 × 10⁻⁹</td>
</tr>
<tr>
<td>minim (U.S.)</td>
<td>min</td>
<td>1/480 US fl oz = 1/60 US fl dr</td>
<td>61.6115921875 × 10⁻⁹</td>
</tr>
<tr>
<td>ounce (fluid Imperial)</td>
<td>fl oz (Imp)</td>
<td>1/160 gal (Imp)</td>
<td>28.4130625 × 10⁻⁶</td>
</tr>
<tr>
<td>ounce (fluid U.S. customary)</td>
<td>US fl oz</td>
<td>1/128 gal (US)</td>
<td>29.5735295625 × 10⁻⁶</td>
</tr>
<tr>
<td>ounce (fluid U.S. food nutrition labeling)</td>
<td>US fl oz</td>
<td>30 mL [16]</td>
<td>3 × 10⁻⁵</td>
</tr>
<tr>
<td>peck (Imperial)</td>
<td>pk</td>
<td>2 gal (Imp)</td>
<td>9.09218 × 10⁻³</td>
</tr>
<tr>
<td>peck (U.S. dry)</td>
<td>pk</td>
<td>1/4 US lvl bu</td>
<td>8.80976754172 × 10⁻³</td>
</tr>
<tr>
<td>Unit Description</td>
<td>Symbol</td>
<td>Conversion Factor</td>
<td>Volume in m³</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--------</td>
<td>-------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>perch</td>
<td>per</td>
<td>16½ ft × 1½ ft × 1 ft</td>
<td>0.700 841 953 152 m³</td>
</tr>
<tr>
<td>pinch (Imperial)</td>
<td>gi (Imp)</td>
<td>1/192 gi</td>
<td>739.923 502 6046 × 10⁻⁹ m³</td>
</tr>
<tr>
<td>pinch (U.S.)</td>
<td>gi (Imp)</td>
<td>1/48 US fl oz</td>
<td>616.115 199 218 75 × 10⁻⁹ m³</td>
</tr>
<tr>
<td>pint (Imperial)</td>
<td>pt (Imp)</td>
<td>½ gal</td>
<td>568.261 25 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>pint (U.S. dry)</td>
<td>pt (US dry)</td>
<td>1/64 bu (US lvl)</td>
<td>550.610 471 3575 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>pint (U.S. fluid)</td>
<td>pt (US fl)</td>
<td>⅛ gal</td>
<td>473.176 473 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>pony</td>
<td></td>
<td>3/4 US fl oz</td>
<td>22.180 147 171 875 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>pintle; quartern</td>
<td>½ gal (Imp)</td>
<td>80 fl oz (Imp)</td>
<td>2.273 045 × 10⁻³ m³</td>
</tr>
<tr>
<td>quart (Imperial)</td>
<td>qt (Imp)</td>
<td>¼ gal (Imp)</td>
<td>1.136 5225 × 10⁻³ m³</td>
</tr>
<tr>
<td>quart (U.S. dry)</td>
<td>qt (US)</td>
<td>1/32 bu (US lvl)</td>
<td>1.101 220 942 715 × 10⁻³ m³</td>
</tr>
<tr>
<td>quart (U.S. fluid)</td>
<td>qt (US)</td>
<td>¼ gal (US fl)</td>
<td>946.352 946 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>quarter; pail</td>
<td>8 bu (Imp)</td>
<td></td>
<td>0.290 949 76 m³</td>
</tr>
<tr>
<td>register ton</td>
<td></td>
<td>100 cu ft</td>
<td>2.831 684 6592 m³</td>
</tr>
<tr>
<td>sack (Imperial); bag</td>
<td>3 bu (Imp)</td>
<td></td>
<td>0.109 106 16 m³</td>
</tr>
<tr>
<td>sack (U.S.)</td>
<td>3 bu (US lvl)</td>
<td></td>
<td>0.105 717 210 500 64 m³</td>
</tr>
<tr>
<td>seam</td>
<td>8 bu (US lvl)</td>
<td></td>
<td>0.281 912 561 335 04 m³</td>
</tr>
<tr>
<td>shot</td>
<td>1 US fl oz</td>
<td></td>
<td>0.297 373 44 m³</td>
</tr>
<tr>
<td>strike (Imperial)</td>
<td>2 bu (Imp)</td>
<td></td>
<td>0.072 737 44 m³</td>
</tr>
<tr>
<td>strike (U.S.)</td>
<td>2 bu (US lvl)</td>
<td></td>
<td>0.070 478 140 333 76 m³</td>
</tr>
<tr>
<td>tablespoon (Canadian)</td>
<td>tbsp</td>
<td>½ fl oz (Imp)</td>
<td>14.206 531 25 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>tablespoon (Imperial)</td>
<td>tbsp</td>
<td>½ fl oz (Imp)</td>
<td>17.758 164 0625 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>tablespoon (metric)</td>
<td>tbsp</td>
<td></td>
<td>15.0 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>tablespoon (U.S. customary)</td>
<td>tbsp</td>
<td>½ US fl oz</td>
<td>14.786 764 7825 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>tablespoon (U.S. food nutrition labeling)</td>
<td>tbsp</td>
<td>15 mL [16]</td>
<td>1.5 × 10⁻⁵ m³</td>
</tr>
<tr>
<td>teaspoon (Canadian)</td>
<td>tsp</td>
<td>1/6 fl oz (Imp)</td>
<td>4.735 510 416 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>teaspoon (Imperial)</td>
<td>tsp</td>
<td>1/24 gi (Imp)</td>
<td>5.919 388 02083 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>teaspoon (metric)</td>
<td>tsp</td>
<td></td>
<td>5.0 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>teaspoon (U.S. customary)</td>
<td>tsp</td>
<td>1/6 US fl oz</td>
<td>4.928 921 595 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>teaspoon (U.S. food nutrition labeling)</td>
<td>tsp</td>
<td>5 mL [16]</td>
<td>5 × 10⁻⁶ m³</td>
</tr>
<tr>
<td>timber foot</td>
<td>1 cu ft</td>
<td></td>
<td>0.028 316 846 592 m³</td>
</tr>
<tr>
<td>ton (displacement)</td>
<td>35 cu ft</td>
<td></td>
<td>0.991 089 630 72 m³</td>
</tr>
<tr>
<td>ton (freight)</td>
<td>40 cu ft</td>
<td></td>
<td>1.132 673 863 68 m³</td>
</tr>
</tbody>
</table>
Conversion of units

<table>
<thead>
<tr>
<th>Unit (description)</th>
<th>Equivalent</th>
<th>Volume (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ton (water)</td>
<td>≡ 28 bu (Imp)</td>
<td>= 1.018 324 16 m³</td>
</tr>
<tr>
<td>tun</td>
<td>≡ 252 gal (wine)</td>
<td>= 0.953 923 769 568 m³</td>
</tr>
<tr>
<td>wey (U.S.)</td>
<td>≡ 40 bu (US lvl)</td>
<td>= 1.409 562 806 675 m³</td>
</tr>
</tbody>
</table>

Plane angle

### Plane angle

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>angular mil</td>
<td>µ</td>
<td>= 2π/6400 rad</td>
<td>≈ 0.981 748 x 10⁻³ rad</td>
</tr>
<tr>
<td>arcminute</td>
<td>'</td>
<td>= 1°/60</td>
<td>≈ 0.290 888 x 10⁻³ rad</td>
</tr>
<tr>
<td>arcsecond</td>
<td>&quot;</td>
<td>= 1°/3600</td>
<td>≈ 4.848 137 x 10⁻⁶ rad</td>
</tr>
<tr>
<td>centesimal minute of arc</td>
<td>'</td>
<td>= 1 grad/100</td>
<td>≈ 0.157 080 x 10⁻³ rad</td>
</tr>
<tr>
<td>centesimal second of arc</td>
<td>&quot;</td>
<td>= 1 grad/(10 000)</td>
<td>≈ 1.570 796 x 10⁻⁶ rad</td>
</tr>
<tr>
<td>degree (of arc)</td>
<td>°</td>
<td>= 1/360 of a revolution = π/180 rad</td>
<td>≈ 17.453 293 x 10⁻³ rad</td>
</tr>
<tr>
<td>grad; gradian; gon</td>
<td>grad</td>
<td>= 1/400 of a revolution = 2π/400 rad = 0.9°</td>
<td>≈ 15.707 963 x 10⁻³ rad</td>
</tr>
<tr>
<td>octant</td>
<td></td>
<td>= 45°</td>
<td>≈ 0.785 398 rad</td>
</tr>
<tr>
<td>quadrant</td>
<td></td>
<td>= 90°</td>
<td>≈ 1.570 796 rad</td>
</tr>
<tr>
<td>radian (SI unit)</td>
<td>rad</td>
<td>The angle subtended at the center of a circle by an arc whose length is equal to the circle's radius. One full revolution encompasses 2π radians.</td>
<td>= 1 rad</td>
</tr>
<tr>
<td>sextant</td>
<td></td>
<td>= 60°</td>
<td>≈ 1.047 198 rad</td>
</tr>
<tr>
<td>sign</td>
<td></td>
<td>= 30°</td>
<td>≈ 0.523 599 rad</td>
</tr>
</tbody>
</table>
Solid angle

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>steradian (SI unit)</td>
<td>sr</td>
<td>The solid angle subtended at the center of a sphere of radius r by a portion of the surface of the sphere having an area r². A sphere encompasses 4π sr.</td>
<td>= 1 sr</td>
</tr>
</tbody>
</table>

Mass

Notes:
• See Weight for detail of mass/weight distinction and conversion.
• In this table, the unit gee is used to denote standard gravity in order to avoid confusion with the "g" symbol for grams.
• In physics, the pound of mass is sometimes written lbm to distinguish it from the pound-force (lbf). It should not be read as the mongrel unit "pound metre''.

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atomic mass unit, unified</td>
<td>u; AMU</td>
<td>≈ 1.660 538 73 × 10⁻²⁷ ± 1.3 × 10⁻³⁶ kg</td>
<td></td>
</tr>
<tr>
<td>atomic unit of mass, electron rest mass</td>
<td>mₑ</td>
<td>≈ 9.109 382 15 × 10⁻³¹ ± 45 × 10⁻³⁹ kg</td>
<td></td>
</tr>
<tr>
<td>bag (coffee)</td>
<td></td>
<td>≈ 60 kg</td>
<td>= 60 kg</td>
</tr>
<tr>
<td>bag (Portland cement)</td>
<td></td>
<td>≈ 94 lb av</td>
<td>≈ 42.637 682 78 kg</td>
</tr>
<tr>
<td>barge</td>
<td></td>
<td>≈ 22½ sh tn</td>
<td>≈ 20 411.656 65 kg</td>
</tr>
<tr>
<td>carat</td>
<td>kt</td>
<td>≈ 3 1/6 gr</td>
<td>≈ 205.196 548 333 mg</td>
</tr>
<tr>
<td>carat (metric)</td>
<td>ct</td>
<td>≈ 200 mg</td>
<td>≈ 200 mg</td>
</tr>
<tr>
<td>clove</td>
<td></td>
<td>≈ 8 lb av</td>
<td>≈ 3.628 738 96 kg</td>
</tr>
<tr>
<td>crith</td>
<td></td>
<td></td>
<td>≈ 89.9349 mg</td>
</tr>
<tr>
<td>dalton</td>
<td></td>
<td>≈ 1.660 902 10 × 10⁻²⁷ ± 1.3 × 10⁻³⁶ kg</td>
<td></td>
</tr>
<tr>
<td>dram (apothecary; troy)</td>
<td>dr t</td>
<td>≈ 60 gr</td>
<td>≈ 3.887 9346 g</td>
</tr>
<tr>
<td>dram (avoirdupois)</td>
<td>dr av</td>
<td>≈ 27 11/32 gr</td>
<td>≈ 1.771 845 195 3125 g</td>
</tr>
<tr>
<td>electronvolt</td>
<td>eV</td>
<td>= 1 eV (energy unit) / c²</td>
<td>= 1.7826 × 10⁻⁶ kg</td>
</tr>
<tr>
<td>gamma</td>
<td>γ</td>
<td>= 1 μg</td>
<td>= 1 μg</td>
</tr>
<tr>
<td>grain</td>
<td>gr</td>
<td>= 1/7000 lb av</td>
<td>= 64.798 91 mg</td>
</tr>
<tr>
<td>grave</td>
<td>G</td>
<td>grave was the original name of the kilogram</td>
<td>= 1 kg</td>
</tr>
<tr>
<td>hundredweight (long)</td>
<td></td>
<td>≈ 112 lb av</td>
<td>≈ 50.802 345 44 kg</td>
</tr>
<tr>
<td>hundredweight (short); cental</td>
<td>sh cwt</td>
<td>= 100 lb av</td>
<td>= 45.359 237 kg</td>
</tr>
<tr>
<td>hyl (CGS unit)</td>
<td></td>
<td>= 1 gee × 1 g × 1 s²/m</td>
<td>= 9.806 65 g</td>
</tr>
<tr>
<td>hyl (MKS unit)</td>
<td></td>
<td>= 1 gee × 1 kg × 1 s²/m</td>
<td>= 9.806 65 kg</td>
</tr>
</tbody>
</table>
### Conversion of Units

<table>
<thead>
<tr>
<th>Unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Conversion Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilogram</td>
<td>kg</td>
<td>≡ mass of the prototype near Paris (≡ mass of 1L of water)</td>
<td>≈ 1 kg (SI base unit)</td>
</tr>
<tr>
<td>Kip</td>
<td>kip</td>
<td>≡ 1000 lb av</td>
<td>≈ 453.592 37 kg</td>
</tr>
<tr>
<td>Mark</td>
<td>mark</td>
<td>≡ 8 oz t</td>
<td>≈ 248.827 8144 g</td>
</tr>
<tr>
<td>Mite</td>
<td>mite</td>
<td>≡ 1/20 gr</td>
<td>≈ 3.239 9455 mg</td>
</tr>
<tr>
<td>Mite (metric)</td>
<td>mite</td>
<td>≡ 1/20 g</td>
<td>≈ 50 mg</td>
</tr>
<tr>
<td>Ounce (apothecary; troy)</td>
<td>oz t</td>
<td>≡ 1/12 lb t</td>
<td>≈ 31.103 4768 g</td>
</tr>
<tr>
<td>Ounce (avoirdupois)</td>
<td>oz av</td>
<td>≡ 1/16 lb</td>
<td>≈ 28.349 523 125 g</td>
</tr>
<tr>
<td>Ounce (U.S. food nutrition labeling)</td>
<td>oz</td>
<td>≡ 28 g [16]</td>
<td>≈ 28 g</td>
</tr>
<tr>
<td>Pennyweight</td>
<td>dwt; pwt</td>
<td>≡ 1/20 oz t</td>
<td>≈ 1.555 173 84 g</td>
</tr>
<tr>
<td>Point</td>
<td>point</td>
<td>≡ 1/100 ct</td>
<td>≈ 2 mg</td>
</tr>
<tr>
<td>Pound (avoirdupois)</td>
<td>lb av</td>
<td>≡ 0.453 592 37 kg = 7000 grains</td>
<td>≈ 0.453 592 37 kg</td>
</tr>
<tr>
<td>Pound (metric)</td>
<td>lb m</td>
<td>≡ 500 g</td>
<td>≈ 500 g</td>
</tr>
<tr>
<td>Pound (troy)</td>
<td>lb t</td>
<td>≡ 5 760 grains</td>
<td>≈ 0.373 241 7216 kg</td>
</tr>
<tr>
<td>Quarter (Imperial)</td>
<td>quarter</td>
<td>≡ 1/4 long cwt = 2 st = 28 lb av</td>
<td>≈ 12 700 586 36 kg</td>
</tr>
<tr>
<td>Quarter (informal)</td>
<td>quarter</td>
<td>≡ ¼ short tn</td>
<td>≈ 226.796 185 kg</td>
</tr>
<tr>
<td>Quarter, long (informal)</td>
<td>quarter</td>
<td>≡ ¼ long tn</td>
<td>≈ 254.011 7272 kg</td>
</tr>
<tr>
<td>Quintal (metric)</td>
<td>q</td>
<td>≡ 100 kg</td>
<td>≈ 100 kg</td>
</tr>
<tr>
<td>Scruple (apothecary)</td>
<td>s ap</td>
<td>≡ 20 gr</td>
<td>≈ 1.295 9782 g</td>
</tr>
<tr>
<td>Sheet</td>
<td>sheet</td>
<td>≡ 1/700 lb av</td>
<td>≈ 647.9891 mg</td>
</tr>
<tr>
<td>Slug; geepound</td>
<td>slug</td>
<td>≡ 1 gee × 1 lb av × 1 s²/ft</td>
<td>≈ 14.593 903 kg</td>
</tr>
<tr>
<td>Stone</td>
<td>st</td>
<td>≡ 14 lb av</td>
<td>≈ 6.350 293 18 kg</td>
</tr>
<tr>
<td>Ton, assay (long)</td>
<td>AT</td>
<td>≡ 1 mg × 1 long tn ÷ 1 oz t</td>
<td>≈ 32.666 667 g</td>
</tr>
<tr>
<td>Ton, assay (short)</td>
<td>AT</td>
<td>≡ 1 mg × 1 sh tn ÷ 1 oz t</td>
<td>≈ 29.166 667 g</td>
</tr>
<tr>
<td>Ton, long</td>
<td>long</td>
<td>≡ 2 240 lb</td>
<td>≈ 1 016.046 9088 kg</td>
</tr>
<tr>
<td>Ton, short</td>
<td>sh</td>
<td>≡ 2 000 lb</td>
<td>≈ 907.184 74 kg</td>
</tr>
<tr>
<td>Tonne (mts unit)</td>
<td>t</td>
<td>≡ 1 000 kg</td>
<td>≈ 1 000 kg</td>
</tr>
<tr>
<td>Wey</td>
<td>wey</td>
<td>≡ 252 lb = 18 st</td>
<td>≈ 114.305 277 24 kg (variants exist)</td>
</tr>
<tr>
<td>Zentner</td>
<td>Ztr.</td>
<td>Definitions vary; see [19] and [14]</td>
<td></td>
</tr>
</tbody>
</table>

### Density
### Density

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>gram per millilitre</td>
<td>g/mL</td>
<td>≡ g/mL</td>
<td>= 1000 kg/m³</td>
</tr>
<tr>
<td>kilogram per cubic metre (SI unit)</td>
<td>kg/m³</td>
<td>≡ kg/m³</td>
<td>= 1 kg/m³</td>
</tr>
<tr>
<td>kilogram per litre</td>
<td>kg/L</td>
<td>≡ kg/L</td>
<td>= 1000 kg/m³</td>
</tr>
<tr>
<td>ounce (avoirdupois) per cubic foot</td>
<td>oz/ft³</td>
<td>≡ oz/ft³</td>
<td>= 1.001153961 kg/m³</td>
</tr>
<tr>
<td>ounce (avoirdupois) per cubic inch</td>
<td>oz/in³</td>
<td>≡ oz/in³</td>
<td>= 1.729994044 × 10³ kg/m³</td>
</tr>
<tr>
<td>ounce (avoirdupois) per gallon (Imperial)</td>
<td>oz/gal</td>
<td>≡ oz/gal</td>
<td>= 6.236023291 kg/m³</td>
</tr>
<tr>
<td>ounce (avoirdupois) per gallon (U.S. fluid)</td>
<td>oz/gal</td>
<td>≡ oz/gal</td>
<td>= 7.489151707 kg/m³</td>
</tr>
<tr>
<td>pound (avoirdupois) per cubic foot</td>
<td>lb/ft³</td>
<td>≡ lb/ft³</td>
<td>= 16.01846337 kg/m³</td>
</tr>
<tr>
<td>pound (avoirdupois) per cubic inch</td>
<td>lb/in³</td>
<td>≡ lb/in³</td>
<td>= 2.767990471 × 10³ kg/m³</td>
</tr>
<tr>
<td>pound (avoirdupois) per gallon (Imperial)</td>
<td>lb/gal</td>
<td>≡ lb/gal</td>
<td>= 99.77637266 kg/m³</td>
</tr>
<tr>
<td>pound (avoirdupois) per gallon (U.S. fluid)</td>
<td>lb/gal</td>
<td>≡ lb/gal</td>
<td>= 119.8264273 kg/m³</td>
</tr>
<tr>
<td>slug per cubic foot</td>
<td>slug/ft³</td>
<td>≡ slug/ft³</td>
<td>= 515.3788184 kg/m³</td>
</tr>
</tbody>
</table>

### Time

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atomic unit of time</td>
<td>au</td>
<td>a₀/(α·c)</td>
<td>≈ 2.418 884 254 × 10⁻¹⁷ s</td>
</tr>
<tr>
<td>Callippic cycle</td>
<td>441 mo (hollow) + 499 mo (full) = 76 a of 365.25 d</td>
<td></td>
<td>= 2.398 3776 × 10⁹ s</td>
</tr>
<tr>
<td>century</td>
<td>c</td>
<td>100 a (see below for definition of year length)</td>
<td>= 100 × year</td>
</tr>
<tr>
<td>day</td>
<td>d</td>
<td>= 24 h</td>
<td>= 86400 s</td>
</tr>
<tr>
<td>day (sidereal)</td>
<td>d</td>
<td>= Time needed for the Earth to rotate once around its axis, determined from successive transits of a very distant astronomical object across an observer's meridian (International Celestial Reference Frame)</td>
<td>≈ 86 164.1 s</td>
</tr>
<tr>
<td>decade</td>
<td>dec</td>
<td>10 a (see below for definition of year length)</td>
<td>= 10 × year</td>
</tr>
<tr>
<td>fortnight</td>
<td>fn</td>
<td>= 2 wk</td>
<td>= 1 209 600 s</td>
</tr>
<tr>
<td>helek</td>
<td>1/1 080 h</td>
<td></td>
<td>= 3.3 s</td>
</tr>
<tr>
<td>Hipparchic cycle</td>
<td>4 Callippic cycles - 1 d</td>
<td></td>
<td>= 9.593 424 × 10³ s</td>
</tr>
<tr>
<td>hour</td>
<td>h</td>
<td>= 60 min</td>
<td>= 3 600 s</td>
</tr>
<tr>
<td>jiffy</td>
<td>j</td>
<td>= 1/60 s</td>
<td>= 0.016 s</td>
</tr>
<tr>
<td>jiffy (alternate)</td>
<td>ja</td>
<td>= 1/100 s</td>
<td>= 10 ms</td>
</tr>
<tr>
<td>ke (quarter of an hour)</td>
<td>¼ h = 1/96 d</td>
<td></td>
<td>= 60 × 60 / 4 s = 900 s</td>
</tr>
</tbody>
</table>

(footnotes in the original document are not included in the table)
<table>
<thead>
<tr>
<th>Unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>ke (traditional)</td>
<td></td>
<td>1/100 d</td>
<td>≡ 1/100 d</td>
</tr>
<tr>
<td>lustre; lustrum</td>
<td></td>
<td>5 a of 365 d</td>
<td>≡ 5.996 16 × 10^3 s</td>
</tr>
<tr>
<td>Metonic cycle; enneadecaeteris</td>
<td></td>
<td>110 mo (hollow) + 125 mo (full) = 6940 d ≈ 19 a</td>
<td>≡ 5.996 16 × 10^3 s</td>
</tr>
<tr>
<td>millennium</td>
<td></td>
<td>1 000 a (see below for definition of year length)</td>
<td>≡ 1000 × year</td>
</tr>
<tr>
<td>milliday</td>
<td>md</td>
<td>1/1 000 d</td>
<td>≡ 24 × 60 × 60 / 1 000 s = 86.4 s</td>
</tr>
<tr>
<td>minute</td>
<td>min</td>
<td>60 s, due to leap seconds sometimes 59 s or 61 s,</td>
<td>≡ 60 s</td>
</tr>
<tr>
<td>moment</td>
<td></td>
<td>90 s</td>
<td>≡ 90 s</td>
</tr>
<tr>
<td>month (full)</td>
<td>mo</td>
<td>30 d [20]</td>
<td>≡ 2 592 000 s</td>
</tr>
<tr>
<td>month (Greg. av.)</td>
<td>mo</td>
<td>Average Gregorian month = 365.2425/12 d = 30.436875 d</td>
<td>≡ 2.6297 × 10^6 s</td>
</tr>
<tr>
<td>month (hollow)</td>
<td>mo</td>
<td>29 d [20]</td>
<td>≡ 2 505 600 s</td>
</tr>
<tr>
<td>month (synodic)</td>
<td>mo</td>
<td>Cycle time of moon phases = 29.530589 days (Average)</td>
<td>≡ 2.551 × 10^6 s</td>
</tr>
<tr>
<td>octaeteris</td>
<td></td>
<td>48 mo (full) + 48 mo (hollow) + 3 mo (full) [21][22] = 8 a of 365.25 d = 2922 d</td>
<td>≡ 2.524 608 × 10^3 s</td>
</tr>
<tr>
<td>Planck time</td>
<td></td>
<td>(Gℏ/ c^5)^(1/2)</td>
<td>≡ 1.351 211 868 × 10^-43 s</td>
</tr>
<tr>
<td>second</td>
<td>s</td>
<td>time of 9 192 631 770 periods of the radiation corresponding to the transition between the 2 hyperfine levels of the ground state of the caesium 133 atom at 0 K [8] (but other seconds are sometimes used in astronomy)</td>
<td>(SI base unit)</td>
</tr>
<tr>
<td>shake</td>
<td></td>
<td>10^-8 s</td>
<td>≡ 10 ns</td>
</tr>
<tr>
<td>sigma</td>
<td></td>
<td>10^-6 s</td>
<td>≡ 1 μs</td>
</tr>
<tr>
<td>Sothic cycle</td>
<td></td>
<td>1 461 a of 365 d</td>
<td>≡ 4.607 4096 × 10^10 s</td>
</tr>
<tr>
<td>svedberg</td>
<td>S</td>
<td>10^-13 s</td>
<td>≡ 100 fs</td>
</tr>
<tr>
<td>week</td>
<td>wk</td>
<td>7 d</td>
<td>≡ 604 800 s</td>
</tr>
<tr>
<td>year (Gregorian)</td>
<td>a, y, or yr</td>
<td>365.2425 d average, calculated from common years (365 d) plus leap years (366 d) on most years divisible by 4. See leap year for details.</td>
<td>≡ 31 556 952 s</td>
</tr>
<tr>
<td>year (Julian)</td>
<td>a, y, or yr</td>
<td>365.25 d average, calculated from common years (365 d) plus one leap year (366 d) every four years</td>
<td>≡ 31 557 600 s</td>
</tr>
<tr>
<td>year (sidereal)</td>
<td>a, y, or yr</td>
<td>time taken for Sun to return to the same position with respect to the stars of the celestial sphere</td>
<td>≡ 365.256 363 d ≈ 31 558 149.7632 s</td>
</tr>
<tr>
<td>year (tropical)</td>
<td>a, y, or yr</td>
<td>Length of time it takes for the Sun to return to the same position in the cycle of seasons</td>
<td>≡ 365.242 190 d ≈ 31 556 925 s</td>
</tr>
</tbody>
</table>

Where UTC is observed, the length of time units longer than 1 s may increase or decrease by 1 s if a leap second occurs during the time interval of interest.
### Frequency

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>hertz (SI unit)</td>
<td>Hz</td>
<td>≡ Number of cycles per second</td>
<td>= 1 Hz = 1/s</td>
</tr>
<tr>
<td>revolutions per minute</td>
<td>rpm</td>
<td>≡ One unit rpm equals one rotation completed around a fixed axis in one minute of time.</td>
<td>≈ 0.104719755 rad/s</td>
</tr>
</tbody>
</table>

### Speed or velocity

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>foot per hour</td>
<td>fph</td>
<td>≡ 1 ft/h</td>
<td>≈ 8.466 667 × 10⁻⁵ m/s</td>
</tr>
<tr>
<td>foot per minute</td>
<td>fpm</td>
<td>≡ 1 ft/min</td>
<td>= 5.08 × 10⁻³ m/s</td>
</tr>
<tr>
<td>foot per second</td>
<td>fps</td>
<td>≡ 1 ft/s</td>
<td>= 3.048 × 10⁻³ m/s</td>
</tr>
<tr>
<td>furlong per fortnight</td>
<td></td>
<td>≡ furlong/fortnight</td>
<td>≈ 1.663 095 × 10⁻⁴ m/s</td>
</tr>
<tr>
<td>inch per minute</td>
<td>ipm</td>
<td>≡ 1 in/min</td>
<td>≈ 4.23 333 × 10⁻⁴ m/s</td>
</tr>
<tr>
<td>inch per second</td>
<td>ips</td>
<td>≡ 1 in/s</td>
<td>= 2.54 × 10⁻² m/s</td>
</tr>
<tr>
<td>kilometre per hour</td>
<td>km/h</td>
<td>≡ 1 km/h</td>
<td>≈ 2.777 778 × 10⁻¹ m/s</td>
</tr>
<tr>
<td>knot</td>
<td>kn</td>
<td>≡ 1 NM/h = 1.852 km/h</td>
<td>≈ 0.514 444 m/s</td>
</tr>
<tr>
<td>knot (Admiralty)</td>
<td>kn</td>
<td>≡ 1 NM (Adm)/h = 1.853 184 km/h</td>
<td>= 0.514 773 m/s</td>
</tr>
<tr>
<td>mach number</td>
<td>M</td>
<td>Ratio of the speed to the speed of sound in the medium. Varies especially with temperature. About 761 mph (1225 kph) in air at sea level to about 660 mph (1062 kph) at jet altitudes. Unitless</td>
<td>≈ 340 to 295 m/s for aircraft</td>
</tr>
<tr>
<td>metre per second (SI unit)</td>
<td>m/s</td>
<td>≡ 1 m/s</td>
<td>= 1 m/s</td>
</tr>
<tr>
<td>mile per hour</td>
<td>mph</td>
<td>≡ 1 mi/h</td>
<td>= 0.447 04 m/s</td>
</tr>
<tr>
<td>mile per minute</td>
<td>mpm</td>
<td>≡ 1 mi/min</td>
<td>= 26.8224 m/s</td>
</tr>
<tr>
<td>mile per second</td>
<td>mps</td>
<td>≡ 1 mi/s</td>
<td>= 1 609.344 m/s</td>
</tr>
<tr>
<td>speed of light in vacuum</td>
<td>c</td>
<td>≡ 299 792 458 m/s</td>
<td>= 299 792 458 m/s</td>
</tr>
<tr>
<td>speed of sound in air</td>
<td>s</td>
<td>Varies especially with temperature. About 761 mph (1225 kph) in air at sea level to about 660 mph (1062 kph) at jet altitudes.</td>
<td>≈ 340 to 295 m/s at aircraft altitudes</td>
</tr>
</tbody>
</table>

A velocity consists of a speed combined with a direction; the speed part of the velocity takes units of speed.
## Conversion of units

### Flow (volume)

#### Flow

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>cubic foot per minute</td>
<td>CFM</td>
<td>≡ 1 ft³/min = 4.719474432 × 10⁻⁴ m³/s</td>
<td></td>
</tr>
<tr>
<td>cubic foot per second</td>
<td>ft³/s</td>
<td>≡ 1 ft³/s = 0.028316846592 m³/s</td>
<td></td>
</tr>
<tr>
<td>cubic inch per minute</td>
<td>in³/min</td>
<td>≡ 1 in³/min = 2.7311773 × 10⁻⁷ m³/s</td>
<td></td>
</tr>
<tr>
<td>cubic inch per second</td>
<td>in³/s</td>
<td>≡ 1 in³/s = 1.6387064 × 10⁻⁵ m³/s</td>
<td></td>
</tr>
<tr>
<td>cubic metre per second (SI unit)</td>
<td>m³/s</td>
<td>≡ 1 m³/s = 1 m³/s</td>
<td></td>
</tr>
<tr>
<td>gallon (U.S. fluid) per day</td>
<td>GPD</td>
<td>≡ 1 gal/d = 4.381263638 × 10⁻⁸ m³/s</td>
<td></td>
</tr>
<tr>
<td>gallon (U.S. fluid) per hour</td>
<td>GPH</td>
<td>≡ 1 gal/h = 1.051503273 × 10⁻⁶ m³/s</td>
<td></td>
</tr>
<tr>
<td>gallon (U.S. fluid) per minute</td>
<td>GPM</td>
<td>≡ 1 gal/min = 6.30901964 × 10⁻⁵ m³/s</td>
<td></td>
</tr>
<tr>
<td>litre per minute</td>
<td>LPM</td>
<td>≡ 1 L/min = 1.6 × 10⁻⁵ m³/s</td>
<td></td>
</tr>
</tbody>
</table>

### Acceleration

#### Acceleration

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>foot per hour per second</td>
<td>fph/s</td>
<td>≡ 1 ft/(h·s)</td>
<td>≈ 8.466 667 × 10⁻⁵ m/s²</td>
</tr>
<tr>
<td>foot per minute per second</td>
<td>fpm/s</td>
<td>≡ 1 ft/(min·s)</td>
<td>≈ 5.08 × 10⁻³ m/s²</td>
</tr>
<tr>
<td>foot per second squared</td>
<td>fps²</td>
<td>≡ 1 ft²/s²</td>
<td>≈ 3.048 × 10⁻¹ m/s²</td>
</tr>
<tr>
<td>gal; galileo</td>
<td>Gal</td>
<td>≡ 1 cm/s²</td>
<td>≈ 10⁻² m/s²</td>
</tr>
<tr>
<td>inch per minute per second</td>
<td>ipm/s</td>
<td>≡ 1 in/(min·s)</td>
<td>≈ 4.233 333 × 10⁻⁴ m/s²</td>
</tr>
<tr>
<td>inch per second squared</td>
<td>ips²</td>
<td>≡ 1 in²/s²</td>
<td>= 2.54 × 10⁻² m/s²</td>
</tr>
<tr>
<td>knot per second</td>
<td>kn/s</td>
<td>≡ 1 kn/s</td>
<td>≈ 5.144 444 × 10⁻¹ m/s²</td>
</tr>
<tr>
<td>metre per second squared (SI unit)</td>
<td>m/s²</td>
<td>≡ 1 m/s²</td>
<td>= 1 m/s²</td>
</tr>
<tr>
<td>mile per hour per second</td>
<td>mph/s</td>
<td>≡ 1 mi/(h·s)</td>
<td>= 4.4704 × 10⁻¹ m/s²</td>
</tr>
<tr>
<td>mile per minute per second</td>
<td>mpm/s</td>
<td>≡ 1 mi/(min·s)</td>
<td>= 26.8224 m/s²</td>
</tr>
<tr>
<td>mile per second squared</td>
<td>mps²</td>
<td>≡ 1 mi/s²</td>
<td>= 1.609 344 × 10³ m/s²</td>
</tr>
<tr>
<td>standard gravity</td>
<td>g</td>
<td>≡ 9.806 65 m/s²</td>
<td>= 9.806 65 m/s²</td>
</tr>
</tbody>
</table>
## Force

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atomic unit of force</td>
<td>(\text{e})</td>
<td>(m_e \alpha^2 c^2/a_0)</td>
<td>(8.238 , 722 , 06 \times 10^{-8}) N [23]</td>
</tr>
<tr>
<td>dyne (cgs unit)</td>
<td>dyn</td>
<td>(g , \text{cm/s}^2)</td>
<td>(10^{-5}) N</td>
</tr>
<tr>
<td>kilogram-force; kilopond; grave-force</td>
<td>kgf; kp; Gf</td>
<td>(g \times 1 , \text{kg})</td>
<td>(9.806 , 65 ) N</td>
</tr>
<tr>
<td>kip; kip-force</td>
<td>kip; kipf; kibf</td>
<td>(g \times 1 , 000 , \text{lb})</td>
<td>(4.448 , 221 , 615 ) N</td>
</tr>
<tr>
<td>milligrave-force, gravet-force</td>
<td>mGf; gf</td>
<td>(g \times 1 , \text{g})</td>
<td>(9.806 , 65 , \text{mN})</td>
</tr>
<tr>
<td>newton (SI unit)</td>
<td>N</td>
<td>A force capable of giving a mass of one kg an acceleration of one metre per second, per second. ([24])</td>
<td>(1 , \text{N} = 1 , \text{kg-m/s}^2)</td>
</tr>
<tr>
<td>ounce-force</td>
<td>ozf</td>
<td>(g \times 1 , \text{oz})</td>
<td>(0.278 , 013 , 850 , 953 ) N</td>
</tr>
<tr>
<td>pound</td>
<td>lb</td>
<td>(\text{slug-ft/s}^2)</td>
<td>(4.448 , 230 , 531) N</td>
</tr>
<tr>
<td>pound-force</td>
<td>lbf</td>
<td>(g \times 1 , \text{lb})</td>
<td>(4.448 , 221 , 615 , 2605) N</td>
</tr>
<tr>
<td>poundal</td>
<td>pdl</td>
<td>(1 , \text{lb-ft/s}^2)</td>
<td>(0.138 , 254 , 954 , 376) N</td>
</tr>
<tr>
<td>sthene (mts unit)</td>
<td>sn</td>
<td>(1 , \text{t-m/s}^2)</td>
<td>(1 \times 10^3) N</td>
</tr>
<tr>
<td>ton-force</td>
<td>tnf</td>
<td>(g \times 1 , \text{sh tn})</td>
<td>(8.896 , 443 , 230 , 521) N</td>
</tr>
</tbody>
</table>

See also: Conversion between weight (force) and mass

## Pressure or mechanical stress

### Pressure

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atmosphere (standard)</td>
<td>atm</td>
<td></td>
<td>(101,325) Pa [25]</td>
</tr>
<tr>
<td>atmosphere (technical)</td>
<td>at</td>
<td>(1 , \text{kgf/cm}^2)</td>
<td>(9.806 , 65 \times 10^3) Pa [25]</td>
</tr>
<tr>
<td>bar</td>
<td>bar</td>
<td></td>
<td>(10^5) Pa</td>
</tr>
<tr>
<td>barye (cgs unit)</td>
<td>dyn/cm(^2)</td>
<td></td>
<td>(0.1) Pa</td>
</tr>
<tr>
<td>centimetre of mercury</td>
<td>cmHg</td>
<td>(13,595.1, \text{kg/m}^3 \times 1 , \text{cm} \times \text{g})</td>
<td>(1.333 , 22 \times 10^3) Pa [25]</td>
</tr>
<tr>
<td>centimetre of water (4 °C)</td>
<td>cmH(_2)O</td>
<td>(999.972, \text{kg/m}^3 \times 1 , \text{cm} \times \text{g})</td>
<td>(98.0638) Pa [25]</td>
</tr>
<tr>
<td>foot of mercury (conventional)</td>
<td>ftHg</td>
<td>(13,595.1, \text{kg/m}^3 \times 1 , \text{ft} \times \text{g})</td>
<td>(40.636, 66 \times 10^3) Pa [25]</td>
</tr>
<tr>
<td>foot of water (39.2 °F)</td>
<td>ftH(_2)O</td>
<td>(999.972, \text{kg/m}^3 \times 1 , \text{ft} \times \text{g})</td>
<td>(2.9888 \times 10^3) Pa [25]</td>
</tr>
<tr>
<td>inch of mercury (conventional)</td>
<td>inHg</td>
<td>(13,595.1, \text{kg/m}^3 \times 1 , \text{in} \times \text{g})</td>
<td>(3.386, 389 \times 10^3) Pa [25]</td>
</tr>
</tbody>
</table>
### Conversion of units

#### Inch of water (39.2 °F)
\[
inH_2O \approx 999.972 \text{ kg/m}^3 \times 1 \text{ in} \times g = 249.082 \text{ Pa} \quad [25]
\]

#### Kilogram-force per square millimetre
\[
\text{kgf/mm}^2 = 1 \text{ kgf/mm}^2 = 9.806 5 \times 10^6 \text{ Pa} \quad [25]
\]

#### Kip per square inch
\[
\text{ksi} = 1 \text{ kipf/sq in} \approx 6.894 757 \times 10^6 \text{ Pa} \quad [25]
\]

#### Micron (micrometre) of mercury
\[
\mu\text{mHg} = 13 595.1 \text{ kg/m}^3 \times 1 \mu\text{m} \times g = 0.001 \text{ torr} \approx 0.133 3224 \text{ Pa} \quad [25]
\]

#### Millimetre of mercury
\[
\text{mmHg} = 13 595.1 \text{ kg/m}^3 \times 1 \text{ mm} \times g \approx 1 \text{ torr} = 133.3224 \text{ Pa} \quad [25]
\]

#### Millimetre of water (3.98 °C)
\[
\text{mmH}_2O \approx 999.972 \text{ kg/m}^3 \times 1 \text{ mm} \times g = 0.999 972 \text{ kgf/m}^2 = 9.806 38 \text{ Pa}
\]

#### Pascal (SI unit)
\[
\text{Pa} = \frac{\text{N}}{\text{m}^2} = \frac{\text{kg/(m·s}^2\text{)}}{= 1 \text{ Pa} \quad [26]
\]

#### Pièze (mts unit)
\[
\text{pz} = 1 \text{ 000 kg/m·s}^2 = 1 \times 10^3 \text{ Pa} = 1 \text{ kPa}
\]

#### Pound per square foot
\[
\text{psf} = 1 \text{ lbf/ft}^2 \approx 47.880 25 \text{ Pa} \quad [25]
\]

#### Pound per square inch
\[
\text{psi} = 1 \text{ lbf/in}^2 \approx 6.894 757 \times 10^3 \text{ Pa} \quad [25]
\]

#### Poundal per square foot
\[
\text{pdl/sq ft} = 1 \text{ pdl/sq ft} \approx 1.488 164 \text{ Pa} \quad [25]
\]

#### Short ton per square foot
\[
\text{sh tn/sq ft} = 1 \text{ sh tn} \times g / 1 \text{ sq ft} \approx 95.760 518 \times 10^3 \text{ Pa}
\]

#### Torr
\[
\text{torr} = 101 325/760 \text{ Pa} \approx 133.3224 \text{ Pa} \quad [25]
\]

### Torque or moment of force

#### Torque

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>foot-pound force</td>
<td>ft lbf</td>
<td>$g \times 1 \text{ lb} \times 1 \text{ ft}$</td>
<td>$= 1.355 817 948 331 4004 \text{ N·m}$</td>
</tr>
<tr>
<td>foot-poundal</td>
<td>ft pdl</td>
<td>$1 \text{ lb·ft}^2/s^2$</td>
<td>$= 4.214 011 009 380 48 \times 10^{-2} \text{ N·m}$</td>
</tr>
<tr>
<td>inch-pound force</td>
<td>in lbf</td>
<td>$g \times 1 \text{ lb} \times 1 \text{ in}$</td>
<td>$= 0.112 984 829 027 6167 \text{ N·m}$</td>
</tr>
<tr>
<td>metre kilogram</td>
<td>m kg</td>
<td>$N \times m / g$</td>
<td>$= 0.101 971 621 \text{ N·m}$</td>
</tr>
<tr>
<td>Newton metre (SI unit)</td>
<td>N m</td>
<td>$N \times m = \text{kg·m}^2/s^2$</td>
<td>$= 1 \text{ N·m}$</td>
</tr>
</tbody>
</table>

### Energy, work, or amount of heat
### Energy

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>barrel of oil equivalent</td>
<td>bboe</td>
<td>$≈ 5.8 \times 10^6 \text{BTU}_{59,\text{°F}}$</td>
<td>$≈ 6.12 \times 10^7 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (ISO)</td>
<td>BTU_ISO</td>
<td>$= 1.0545 \times 10^3 \text{J}$</td>
<td>$= 1.0545 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (International Table)</td>
<td>BTU_IT</td>
<td></td>
<td>$= 1.055 055 852 62 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (mean)</td>
<td>BTU_mean</td>
<td></td>
<td>$= 1.055 87 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (thermochemical)</td>
<td>BTU_th</td>
<td></td>
<td>$= 1.054 350 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (39 °F)</td>
<td>BTU_39 °F</td>
<td></td>
<td>$= 1.059 67 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (59 °F)</td>
<td>BTU_59 °F</td>
<td>$= 1.054 804 \times 10^3 \text{J}$</td>
<td>$= 1.054 804 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (60 °F)</td>
<td>BTU_60 °F</td>
<td></td>
<td>$= 1.054 68 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>British thermal unit (63 °F)</td>
<td>BTU_63 °F</td>
<td></td>
<td>$= 1.0546 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>calorie (International Table)</td>
<td>cal_IT</td>
<td>$= 4.1868 \text{J}$</td>
<td>$= 4.1868 \text{J}$</td>
</tr>
<tr>
<td>calorie (mean)</td>
<td>cal_mean</td>
<td></td>
<td>$= 4.190 02 \text{J}$</td>
</tr>
<tr>
<td>calorie (thermochemical)</td>
<td>cal_th</td>
<td></td>
<td>$= 4.184 \text{J}$</td>
</tr>
<tr>
<td>calorie (3.98 °C)</td>
<td>cal_3.98 °C</td>
<td></td>
<td>$= 4.2045 \text{J}$</td>
</tr>
<tr>
<td>calorie (15 °C)</td>
<td>cal_15 °C</td>
<td></td>
<td>$= 4.1855 \text{J}$</td>
</tr>
<tr>
<td>calorie (20 °C)</td>
<td>cal_20 °C</td>
<td></td>
<td>$= 4.1819 \text{J}$</td>
</tr>
<tr>
<td>Celsius heat unit (International Table)</td>
<td>CHU_IT</td>
<td>$= 1 \text{BTU}_{IT} \times 1 \text{K}/\text{°R}$</td>
<td>$= 1.899 100 534 716 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>cubic centimetre of atmosphere; standard cubic centimetre</td>
<td>cc atm; scc</td>
<td>$= 1 \text{atm} \times 1 \text{cm}^3$</td>
<td>$= 0.101 325 \text{J}$</td>
</tr>
<tr>
<td>cubic foot of atmosphere; standard cubic foot</td>
<td>cu ft atm; scf</td>
<td>$= 1 \text{atm} \times 1 \text{ft}^3$</td>
<td>$= 2.869 204 480 9344 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>cubic foot of natural gas</td>
<td></td>
<td>$= 1 000 \text{BTU}_{IT}$</td>
<td>$= 1.055 055 852 62 \times 10^6 \text{J}$</td>
</tr>
<tr>
<td>cubic yard of atmosphere; standard cubic yard</td>
<td>cu yd atm; scy</td>
<td>$= 1 \text{atm} \times 1 \text{yd}^3$</td>
<td>$= 77.468 520 985 2288 \times 10^3 \text{J}$</td>
</tr>
<tr>
<td>electronvolt</td>
<td>eV</td>
<td>$= e \times 1 \text{V}$</td>
<td>$= 1.602 177 33 \times 10^{-19} \pm 4.9 \times 10^{-26} \text{J}$</td>
</tr>
<tr>
<td>erg (cgs unit)</td>
<td>erg</td>
<td>$= 1 \text{g cm}^2/\text{s}^2$</td>
<td>$= 10^{-7} \text{J}$</td>
</tr>
<tr>
<td>foot-pound force</td>
<td>ft lbf</td>
<td>$= g \times 1 \text{lb} \times 1 \text{ft}$</td>
<td>$= 1.355 817 948 331 4004 \text{J}$</td>
</tr>
<tr>
<td>foot-poundal</td>
<td>ft pdl</td>
<td>$= 1 \text{lb} \text{ft}^2/\text{s}^2$</td>
<td>$= 4.214 011 009 380 48 \times 10^{-2} \text{J}$</td>
</tr>
<tr>
<td>gallon-atmosphere (imperial)</td>
<td>imp gal atm</td>
<td>$= 1 \text{atm} \times 1 \text{gal (imp)}$</td>
<td>$= 460.632 569 25 \text{J}$</td>
</tr>
<tr>
<td>gallon-atmosphere (US)</td>
<td>US gal atm</td>
<td>$= 1 \text{atm} \times 1 \text{gal (US)}$</td>
<td>$= 383.556 849 0138 \text{J}$</td>
</tr>
<tr>
<td>hartree, atomic unit of energy</td>
<td>$E_h$</td>
<td>$= m_e c^2 \alpha^2 = (2 \text{ Ry})$</td>
<td>$= 4.359 744 \times 10^{-18} \text{J}$</td>
</tr>
</tbody>
</table>
### Conversion of units

<table>
<thead>
<tr>
<th>Units</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>horsepower-hour</td>
<td>hp h</td>
<td>= 1 hp × 1 h</td>
<td>2.684 519 537 696 172 792 × 10^6 J</td>
</tr>
<tr>
<td>inch-pound force</td>
<td>in lbf</td>
<td>= g × 1 lb × 1 in</td>
<td>0.112 984 829 027 616 7 J</td>
</tr>
<tr>
<td>joule (SI unit)</td>
<td>J</td>
<td>The work done when a force of one newton moves the point of its application a distance of one metre in the direction of the force.[24]</td>
<td>1 J = 1 m·N = 1 kg·m^2/s</td>
</tr>
<tr>
<td>kilocalorie; large calorie</td>
<td>kcal; Cal</td>
<td>= 1 000 cal_IT</td>
<td>4.1868 × 10^3 J</td>
</tr>
<tr>
<td>kilowatt-hour; Board of Trade Unit</td>
<td>kW·h; B.O.T.U.</td>
<td>= 1 kW × 1 h</td>
<td>3.6 × 10^6 J</td>
</tr>
<tr>
<td>litre-atmosphere</td>
<td>l atm; sl</td>
<td>= 1 atm × 1 L</td>
<td>101.325 J</td>
</tr>
<tr>
<td>quad</td>
<td>10^{15} BTU_IT</td>
<td>≡ 1 atm × 1 \text{cm}^3/min</td>
<td>1.055 055 852 62 × 10^{18} J</td>
</tr>
<tr>
<td>rydberg</td>
<td>Ry</td>
<td>= R_\infty \cdot \hbar \cdot c</td>
<td>≈ 2.179 872 × 10^{-16} J</td>
</tr>
<tr>
<td>therm (E.C.)</td>
<td></td>
<td>= 100 000 BTU_IT</td>
<td>105.505 585 262 × 10^6 J</td>
</tr>
<tr>
<td>therm (U.S.)</td>
<td></td>
<td>= 100 000 BTU_90°F</td>
<td>105.4804 × 10^6 J</td>
</tr>
<tr>
<td>thermie</td>
<td>th</td>
<td>= 1 Mcal_IT</td>
<td>4.1868 × 10^3 J</td>
</tr>
<tr>
<td>ton of coal equivalent</td>
<td>TCE</td>
<td>= 7 Gcal_th</td>
<td>29.3076 × 10^3 J</td>
</tr>
<tr>
<td>ton of oil equivalent</td>
<td>TOE</td>
<td>= 10 Gcal_th</td>
<td>41.868 × 10^3 J</td>
</tr>
<tr>
<td>ton of TNT</td>
<td>tTNT</td>
<td>= 1 Gcal_th</td>
<td>4.184 × 10^9 J</td>
</tr>
</tbody>
</table>

### Power or heat flow rate

#### Power

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atmosphere-cubic centimetre per minute</td>
<td>atm ccm</td>
<td>= 1 atm × 1 cm³/min</td>
<td>1.688 75 × 10⁻³ W</td>
</tr>
<tr>
<td>atmosphere-cubic centimetre per second</td>
<td>atm ccs</td>
<td>= 1 atm × 1 cm³/s</td>
<td>0.101 325 W</td>
</tr>
<tr>
<td>atmosphere-cubic foot per hour</td>
<td>atm cfh</td>
<td>= 1 atm × 1 cu ft/h</td>
<td>0.797 001 244 704 W</td>
</tr>
<tr>
<td>atmosphere-cubic foot per minute</td>
<td>atm cfm</td>
<td>= 1 atm × 1 cu ft/min</td>
<td>47.820 074 682 24 W</td>
</tr>
<tr>
<td>atmosphere-cubic foot per second</td>
<td>atm cf</td>
<td>= 1 atm × 1 cu ft/s</td>
<td>2.869 204 480 934 10³ W</td>
</tr>
<tr>
<td>BTU (International Table) per hour</td>
<td>BTU_IT/h</td>
<td>= 1 BTU_IT/h</td>
<td>0.293 071 W</td>
</tr>
<tr>
<td>BTU (International Table) per minute</td>
<td>BTU_IT/min</td>
<td>= 1 BTU_IT/min</td>
<td>17.584 264 W</td>
</tr>
<tr>
<td>BTU (International Table) per second</td>
<td>BTU_IT/s</td>
<td>= 1 BTU_IT/s</td>
<td>1.055 055 852 62 × 10⁻³ W</td>
</tr>
<tr>
<td>calorie (International Table) per second</td>
<td>cal_IT/s</td>
<td>= 1 cal_IT/s</td>
<td>4.1868 W</td>
</tr>
<tr>
<td>foot-pound-force per hour</td>
<td>ft lbf/h</td>
<td>= 1 ft lbf/h</td>
<td>3.766 161 × 10⁻³ W</td>
</tr>
</tbody>
</table>
### Conversion of units

<table>
<thead>
<tr>
<th>Action</th>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atomic unit of action</td>
<td>au</td>
<td>ℏ</td>
<td>≡ ℏ/h²π</td>
<td>≈ 1.054 571 68 × 10⁻³⁴ J/s²</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>Name of unit</td>
<td>Symbol</td>
<td>Definition</td>
<td>Relation to SI units</td>
</tr>
<tr>
<td>pascal second (SI unit)</td>
<td>Pa·s</td>
<td>N·s/m²</td>
<td>= 1 Pa·s</td>
<td></td>
</tr>
<tr>
<td>poise (cgs unit)</td>
<td>P</td>
<td>10⁻¹ Pa·s = 0.1 Pa·s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pound per foot hour</td>
<td>lb/(ft·h)</td>
<td>1 lb/(ft·h)</td>
<td>≈ 4.133 789 × 10⁻³ Pa·s</td>
<td></td>
</tr>
<tr>
<td>pound per foot second</td>
<td>lb/(ft·s)</td>
<td>1 lb/(ft·s)</td>
<td>≈ 1.488164 Pa·s</td>
<td></td>
</tr>
<tr>
<td>pound-force second per square foot</td>
<td>lbf·s/ft²</td>
<td>1 lbf·s/ft²</td>
<td>≈ 47.88026 Pa·s</td>
<td></td>
</tr>
<tr>
<td>pound-force second per square inch</td>
<td>lbf·s/in²</td>
<td>1 lbf·s/in²</td>
<td>≈ 6894.757 Pa·s</td>
<td></td>
</tr>
</tbody>
</table>
### Kinematic viscosity

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>square foot per second</td>
<td>ft²/s</td>
<td>≡ 1 ft²/s</td>
<td>= 0.09290304 m²/s</td>
</tr>
<tr>
<td>square metre per second (SI unit)</td>
<td>m²/s</td>
<td>≡ 1 m²/s</td>
<td>= 1 m²/s</td>
</tr>
<tr>
<td>stokes (cgs unit)</td>
<td>St</td>
<td>= 10⁻⁴ m²/s</td>
<td>= 10⁻³ m²/s</td>
</tr>
</tbody>
</table>

### Electric current

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ampere (SI base unit)</td>
<td>A</td>
<td>The constant current needed to produce a force of 2 × 10⁻⁷ newton per metre between two straight parallel conductors of infinite length and negligible circular cross-section placed one metre apart in a vacuum.</td>
<td>≡ 1 A</td>
</tr>
<tr>
<td>electromagnetic unit; abampere (cgs unit)</td>
<td>abamp</td>
<td>10 A</td>
<td>= 10 A</td>
</tr>
<tr>
<td>esu per second; statampere (cgs unit)</td>
<td>esu/s</td>
<td>(0.1 A·m/s) / c</td>
<td>≈ 3.335641 × 10⁻¹⁰ A</td>
</tr>
</tbody>
</table>

### Electric charge

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>abcoulomb; electromagnetic unit (cgs unit)</td>
<td>abC; emu</td>
<td>10 C</td>
<td>= 10 C</td>
</tr>
<tr>
<td>atomic unit of charge</td>
<td>au</td>
<td>e</td>
<td>≈ 1.602 176 462 × 10⁻¹⁹ C</td>
</tr>
<tr>
<td>coulomb (SI unit)</td>
<td>C</td>
<td>The amount of electricity carried in one second of time by one ampere of current.</td>
<td>≡ 1 C = 1 A·s</td>
</tr>
<tr>
<td>faraday</td>
<td>F</td>
<td>1 mol × N/A · e</td>
<td>≈ 96 485.3383 C</td>
</tr>
<tr>
<td>statcoulomb; franklin; electrostatic unit (cgs unit)</td>
<td>statC; Fr; esu</td>
<td>(0.1 A·m) / c</td>
<td>≈ 3.335 641 × 10⁻¹⁰ C</td>
</tr>
</tbody>
</table>
Electric dipole

### Electric dipole

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>atomic unit of electric dipole moment</td>
<td>$e_0$</td>
<td>$\approx 8.478,352,81 \times 10^{-30} \text{ C} \cdot \text{m}^2$</td>
<td></td>
</tr>
</tbody>
</table>

Electromotive force, electric potential difference

### Voltage, electromotive force

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>abvolt (cgs unit)</td>
<td>abV</td>
<td>$\equiv 1 \times 10^{-8} \text{ V}$</td>
<td>$= 1 \times 10^{-8} \text{ V}$</td>
</tr>
<tr>
<td>statvolt (cgs unit)</td>
<td>statV</td>
<td>$\equiv c \cdot (1 , \mu\text{J/A} \cdot \text{m})$</td>
<td>$= 299.792,458 \text{ V}$</td>
</tr>
<tr>
<td>volt (SI unit)</td>
<td>V</td>
<td>The difference in electric potential across two points along a conducting wire carrying one ampere of constant current when the power dissipated between the points equals one watt.</td>
<td>$= 1 \text{ V} = 1 \text{ W/A} = 1 \frac{\text{kg} \cdot \text{m}^2}{(\text{A} \cdot \text{s})^3}$</td>
</tr>
</tbody>
</table>

Electrical resistance

### Electrical resistance

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ohm (SI unit)</td>
<td>Ω</td>
<td>The resistance between two points in a conductor when one volt of electric potential difference, applied to these points, produces one ampere of current in the conductor.</td>
<td>$= 1 \Omega = 1 \frac{\text{V}}{\text{A}} = 1 \frac{\text{kg} \cdot \text{m}^2}{(\text{A} \cdot \text{s}^2)}$</td>
</tr>
</tbody>
</table>

Capacitance

### Capacitor's ability to store charge

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>farad (SI unit)</td>
<td>F</td>
<td>The capacitance between two parallel plates that results in one volt of potential difference when charged by one coulomb of electricity.</td>
<td>$= 1 \text{ F} = 1 \frac{\text{C}}{\text{V}} = 1 \frac{\text{A}^2 \cdot \text{s}}{\text{kg} \cdot \text{m}^2}$</td>
</tr>
</tbody>
</table>
Magnetic flux

### Magnetic flux

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxwell (CGS unit)</td>
<td>Mx</td>
<td>$10^{-8}$ Wb [29]</td>
<td>$= 1 \times 10^{-8}$ Wb</td>
</tr>
<tr>
<td>weber (SI unit)</td>
<td>Wb</td>
<td>Magnetic flux which, linking a circuit of one turn,</td>
<td>$= 1$ Wb = $1$ V s = $1$ kg m$^2$/A s$^2$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>would produce in it an electromotive force of 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>volt if it were reduced to zero at a uniform rate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>in 1 second. [24]</td>
<td></td>
</tr>
</tbody>
</table>

### Magnetic flux density

What physicists call Magnetic field is called Magnetic flux density by electrical engineers and magnetic induction by applied mathematicians and electrical engineers.

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>gauss (CGS unit)</td>
<td>G</td>
<td>$\equiv Mx/cm^2 = 10^{-4}$ T</td>
<td>$= 1 \times 10^{-4}$ T [30]</td>
</tr>
<tr>
<td>tesla (SI unit)</td>
<td>T</td>
<td>$\equiv Wb/m^2$</td>
<td>$= 1$ T = $1$ Wb/m$^2$ = $1$ kg/(A s$^2$)</td>
</tr>
</tbody>
</table>

### Inductance

#### Inductance

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>henry (SI unit)</td>
<td>H</td>
<td>The inductance of a closed circuit that produces one volt of electromotive force when the current in the circuit varies at a uniform rate of one ampere per second. [24]</td>
<td>$= 1$ H = $1$ Wb/A = $1$ kg m$^2$/A s$^2$</td>
</tr>
</tbody>
</table>

### Temperature

#### Temperature

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Conversion to kelvin</th>
</tr>
</thead>
<tbody>
<tr>
<td>degree Celsius</td>
<td>°C</td>
<td>[K] = [°C] + 273.15</td>
</tr>
<tr>
<td>degree Delisle</td>
<td>°De</td>
<td>[K] = 373.15 − [°De] × 2/3</td>
</tr>
<tr>
<td>degree Newton</td>
<td>°N</td>
<td>[K] = [°N] × 100/33 + 273.15</td>
</tr>
<tr>
<td>degree Rankine</td>
<td>°R; °Ra</td>
<td>[K] = [°R] × 5/9</td>
</tr>
<tr>
<td>degree Réaumur</td>
<td>°Ré</td>
<td>[K] = [°Ré] × 5/4 + 273.15</td>
</tr>
<tr>
<td>degree Rømer</td>
<td>°Rø</td>
<td>[K] = ([°Rø] − 7.5) × 40/21 + 273.15</td>
</tr>
<tr>
<td>kelvin (SI base unit)</td>
<td>K</td>
<td>$= 1/273.16$ of the thermodynamic temperature of the triple point of water. [8]</td>
</tr>
</tbody>
</table>
**Information entropy**

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
<th>Relation to bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI unit</td>
<td>J/K</td>
<td>≡ J/K</td>
<td>= 1 J/K</td>
<td></td>
</tr>
<tr>
<td>nat; nip; nepit</td>
<td>nat</td>
<td>≡ $k_B$</td>
<td>= 1.380 650 5(23) × 10$^{-23}$ J/K</td>
<td></td>
</tr>
<tr>
<td>bit; shannon</td>
<td>bit; b; Sh</td>
<td>≡ ln(2) × $k_B$</td>
<td>= 9.569 940 (16) × 10$^{-24}$ J/K</td>
<td>≈ 1 bit</td>
</tr>
<tr>
<td>ban; hartley</td>
<td>ban; Hart</td>
<td>≡ ln(10) × $k_B$</td>
<td>= 3.179 065 3(53) × 10$^{-23}$ J/K</td>
<td></td>
</tr>
<tr>
<td>nibble</td>
<td></td>
<td>≡ 4 bits</td>
<td>= 3.827 976 0(64) × 10$^{-23}$ J/K</td>
<td>≈ 2$^2$ bit</td>
</tr>
<tr>
<td>byte</td>
<td>B</td>
<td>≡ 8 bits</td>
<td>= 7.655 952 (13) × 10$^{-23}$ J/K</td>
<td>≈ 2$^3$ bit</td>
</tr>
<tr>
<td>kilobyte (decimal)</td>
<td>kB</td>
<td>≡ 1 000 B</td>
<td>= 7.655 952 (13) × 10$^{-20}$ J/K</td>
<td></td>
</tr>
<tr>
<td>kilobyte (kibibyte)</td>
<td>KB; KiB</td>
<td>≡ 1 024 B</td>
<td>= 7.839 695 (13) × 10$^{-20}$ J/K</td>
<td>≈ 2$^{10}$ bit</td>
</tr>
</tbody>
</table>

Often, information entropy is measured in shannons, whereas the (discrete) storage space of digital devices is measured in bits. Thus, uncompressed redundant data occupy more than one bit of storage per shannon of information entropy. The multiples of a bit listed above are usually used with this meaning. Other times the bit is used as a measure of information entropy and is thus a synonym of shannon.

**Luminous intensity**

The candela is the preferred nomenclature for the SI unit.

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>candela (SI base unit); candle</td>
<td>cd</td>
<td>The luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency $540 \times 10^{15}$ hertz and that has a radiant intensity in that direction of 1/683 watt per steradian.\textsuperscript{[8]}</td>
<td>≈ 1 cd</td>
</tr>
<tr>
<td>candlepower (new)</td>
<td>cp</td>
<td>≡ cd The use of candlepower as a unit is discouraged due to its ambiguity.</td>
<td>≈ 1 cd</td>
</tr>
<tr>
<td>candlepower (old, pre-1948)</td>
<td>cp</td>
<td>Varies and is poorly reproducible.\textsuperscript{[31]} Approximately 0.981 cd.\textsuperscript{[14]}</td>
<td>≈ 0.981 cd</td>
</tr>
</tbody>
</table>

**Luminance**
### Luminance

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>candela per square foot</td>
<td>cd/ft²</td>
<td>( \equiv ) cd/ft²</td>
<td>( \approx 10.763910417 \text{ cd/m}^2 )</td>
</tr>
<tr>
<td>candela per square inch</td>
<td>cd/in²</td>
<td>( \equiv ) cd/in²</td>
<td>( \approx 1550.0031 \text{ cd/m}^2 )</td>
</tr>
<tr>
<td>candela per square metre (SI unit); nit (deprecated)</td>
<td>cd/m²</td>
<td>( \equiv ) cd/m²</td>
<td>( \approx 1 \text{ cd/m}^2 )</td>
</tr>
<tr>
<td>footlambert</td>
<td>fL</td>
<td>( \equiv ) ( \frac{1}{\pi} \text{ cd/ft}^2 )</td>
<td>( \approx 3.4262590996 \text{ cd/m}^2 )</td>
</tr>
<tr>
<td>lambert</td>
<td>L</td>
<td>( \equiv ) ( \frac{10^4}{\pi} \text{ cd/m}^2 )</td>
<td>( \approx 3183.0988618 \text{ cd/m}^2 )</td>
</tr>
<tr>
<td>stilb (CGS unit)</td>
<td>sb</td>
<td>( \equiv ) ( 10^4 \text{ cd/m}^2 )</td>
<td>( \approx 1 \times 10^4 \text{ cd/m}^2 )</td>
</tr>
</tbody>
</table>

### Luminous flux

**Luminous flux**

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>lumen (SI unit)</td>
<td>lm</td>
<td>( \equiv ) cd·sr</td>
<td>( \equiv 1 \text{ lm} = 1 \text{ cd·sr} )</td>
</tr>
</tbody>
</table>

### Illuminance

**Illuminance**

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>footcandle; lumen per square foot</td>
<td>fc</td>
<td>( \equiv \text{ lm/ft}^2 )</td>
<td>( \equiv 10.763910417 \text{ lx} )</td>
</tr>
<tr>
<td>lumen per square inch</td>
<td>lm/in²</td>
<td>( \equiv \text{ lm/in}^2 )</td>
<td>( \equiv 1550.0031 \text{ lx} )</td>
</tr>
<tr>
<td>lux (SI unit)</td>
<td>lx</td>
<td>( \equiv \text{ lm/m}^2 )</td>
<td>( \equiv 1 \text{ lx} = 1 \text{ lm/m}^2 )</td>
</tr>
<tr>
<td>phot (CGS unit)</td>
<td>ph</td>
<td>( \equiv \text{ lm/cm}^2 )</td>
<td>( \equiv 1 \times 10^4 \text{ lx} )</td>
</tr>
</tbody>
</table>

### Radiation - source activity
### Radioactivity

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>becquerel (SI unit)</td>
<td>Bq</td>
<td>≡ Number of disintegrations per second</td>
<td>= 1 Bq = 1/s</td>
</tr>
<tr>
<td>curie</td>
<td>Ci</td>
<td>≡ 3.7 × 10¹⁰ Bq</td>
<td>= 3.7 × 10¹⁰ Bq [32]</td>
</tr>
<tr>
<td>rutherford (H)</td>
<td>rd</td>
<td>≡ 1 MBq</td>
<td>= 1 × 10⁶ Bq</td>
</tr>
</tbody>
</table>

Please note that although becquerel (Bq) and hertz (Hz) both ultimately refer to the same SI base unit (s⁻¹), Hz is used only for periodic phenomena, and Bq is only used for stochastic processes associated with radioactivity. [33]

### Radiation - exposure

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>roentgen</td>
<td>R</td>
<td>1 R ≡ 2.58 × 10⁻⁴ C/kg [29]</td>
<td>= 2.58 × 10⁻⁴ C/kg</td>
</tr>
</tbody>
</table>

The roentgen is not a SI unit and the NIST strongly discourages its continued use. [34]

### Radiation - absorbed dose

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>gray (SI unit)</td>
<td>Gy</td>
<td>≡ 1 J/kg = 1 m²/s² [35]</td>
<td>= 1 Gy</td>
</tr>
<tr>
<td>rad</td>
<td>rad</td>
<td>≡ 0.01 Gy [29]</td>
<td>= 0.01 Gy</td>
</tr>
</tbody>
</table>

### Radiation - equivalent dose

<table>
<thead>
<tr>
<th>Name of unit</th>
<th>Symbol</th>
<th>Definition</th>
<th>Relation to SI units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Röntgen equivalent man</td>
<td>rem</td>
<td>≡ 0.01 Sv</td>
<td>= 0.01 Sv</td>
</tr>
<tr>
<td>sievert (SI unit)</td>
<td>Sv</td>
<td>≡ 1 J/kg [33]</td>
<td>= 1 Sv</td>
</tr>
</tbody>
</table>

Although the definitions for sievert (Sv) and gray (Gy) would seem to indicate that they measure the same quantities, this is not the case. The effect of receiving a certain dose of radiation (given as Gy) is variable and depends on many factors, thus a new unit was needed to denote the biological effectiveness of that dose on the body; this is known as the equivalent dose and is shown in Sv. The general relationship between absorbed dose and equivalent dose can be represented as

$$ H = Q \cdot D $$

where $H$ is the equivalent dose, $D$ is the absorbed dose, and $Q$ is a dimensionless quality factor. Thus, for any quantity of $D$ measured in Gy, the numerical value for $H$ measured in Sv may be different. [36]
Software tools

Home and office computers come with converters in bundled spreadsheet applications or can access free converters via the Internet. Units and measurements can be easily converted using these tools, but only if the units are explicitly defined and the conversion is compatible (e.g., cmHg to kPa).

Free conversion software

• Units (software), a popular cross-platform command-line utility
• Converter[37], contextual unit converter for Mozilla Firefox browsers
• Converber[38], portable application converting utility
• calculla[39] calculla - online web converters
• iMetrix[40] - unit converter for xp
• uniteasy[41] online scientific unit conversion
• Unit Converter Add-in for Excel[42] - allow a large selection of unit conversions within the Microsoft Excel spreadsheet program.
• Unit Converter[43] simple and extensible unit converter
• Portable Unit Converter[44] including 4500 units, 33 unit-categories and the possibility to create custom units

General commercial sources of converters

• Advanced electronic calculators have unit-conversion functionality.
• Spreadsheet programs usually provide conversion functions or formulas or the user can write their own.
• Commercial mathematical, scientific and technical applications often include converters.

See also

• Accuracy and precision
• English units
• False precision
• Imperial units
• International System of Units
• Mesures usuelles
• Metric system
• Natural units
• Rounding
• Significant figures
• Temperature conversion
• United States customary units
• Units conversion by factor-label
• Units of measurement

External links

• British law: Units of measurement regulations 1995[45]
• ConvertBuster[46] Variety of conversion tools to convert easily.
• How Many? A dictionary of units of measurement[47]
• NIST: Fundamental physical constants — Non-SI units [48]PDF (35.7 KB)
• Online Conversion Calculators[50] Very extensive list of conversions from-to equivalent units.
• The Unified Code for Units of Measure[51]
• Units, Symbols, and Conversions XML Dictionary[52]
• Multilingual Online Conversion of Units[53]
• Temperature Converter[54]
References


[19] The Swiss Federal Office for Metrology gives Zentner on a German language web page (http://www.metas.ch/de/scales/systemtch.html) and quintal on the English translation of that page (http://www.metas.ch/en/scales/systemtch.html); the unit is marked "spécifiquement suisse !" 


[24] [Comité International des Poids et Mesures (http://www.bipm.org/en/CIPM/db/1946/2)], Resolution 2], 1946, , retrieved August 26, 2009


Conversion of units


[34] The NIST Guide to the SI (Special Publication 811), section 5.2 (http://physics.nist.gov/Pubs/SP811/sec05.html#5.2), 2008, retrieved August 27, 2009


[38] http://www.xyntec.com/converber.htm


[52] http://www.posc.org/refs/poscUnits20.xml


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