**Harold’s Physics Units of Measure**

**Cheat Sheet**

26 August 2022

**The 7 Base Units of Measure**

|  |  |  |  |
| --- | --- | --- | --- |
| **Quantity Name** | **Symbol** | **Metric Units (SI)** | **Imperial Units (English)** |
| **1. Length / Distance** | l, x, y, z | meter (m) | foot (ft) |
| **2. Mass** | m, M | kilogram (kg) | slug (or lb) |
| **3. Time** | t | second (s) | |
| **4. Temperature** | T | Kelvin (K)  Celsius (⁰C) | Fahrenheit (⁰F) |
| **5. Electrical Current** | i | Ampere (A) or C/s | |
| **6. Amount of Substance** | M, χ | mole (mol) | 1 mol = 6.02214076 × 1023 |
| **7. Luminous Intensity** | lv | Candela (cd) | |
| **Note**: The 7 base units are mutually independent from each other.  All other units of measurement can be derived from them. | | | |

**Derived Units of Measure**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Quantity Name** | **Symbol** | **SI**  **Units** | | **English (Imperial)**  **Units** | |
| **Length / Displacement** | s, d, h | meter (m) |  | foot (ft) |  |
| **Area** | A, S |  | m2 |  | ft2 |
| **Volume** | V | liter (l) | m3 | fluid ounce (fl) | ft3 |
| **Velocity / Speed** | v, s |  | m/s |  | ft/s |
| **Acceleration** | a, g | g = 9.81 m/s2 | m/s2 | g = 32.2 ft/s2 | ft/s2 |
| **Jerk / Jolt** | J |  | m/s3 |  | ft/s3 |
| **Impulse** | I |  | N • s  kg • m/s |  | lb • ft/s |
| **Linear Momentum** | p |  | kg • m/s |  | lb • ft/s |
| **Force** | F | Newton (N) | kg • m/s2 | pound (lb) | slug • ft/s2 |
| **Energy / Work / Heat** | E, W, KE, U, Q | Joule (J) | N • m  kg • m2/s2 | calorie (cal) | ft • lb |
| **Power** | P | Watt (W) | J/s  kg • m/s3 | horsepower (hp) | ft • lb/s |
| **Surface Tension** | T |  | N/m  kg/s2 |  | lb/ft |
| **Pressure** | P | Pascal (pa)  bar | N/m2  kg • m/s2 | atmosphere (atm.) |  |
| **Density** | ρ |  | kg/m3 |  | slug/m3 |
| **Wavelength** | λ |  | m |  |  |
| **Frequency** | F, v | Hertz (Hz) | 1/s | cycles/s |  |
| **Time Period** | T |  | s |  |  |
| **Angular Displacement / Plane Angle** | θ | radian (rad) |  | Supplementary unit | |
| **Solid Angle** | Ω, sr | Steradian (Sr) |  | Supplementary unit | |
| **Angular Velocity / Frequency** | ω |  | rad/s |  |  |
| **Angular Acceleration** | α |  | rad/s2 |  |  |
| **Moment of Inertia** | I |  | kg • m2 |  |  |
| **Angular Momentum** | J, L |  | kg • m2/s  I • ω |  |  |
| **Torque**  **(Moment of Force)** | 𝞽 |  | N • m |  |  |
| **Angular Impulse** | J |  | N • m • s |  |  |
| **Electric Charge** | Q, q, e | Coulomb (C) | A • s |  |  |
| **Current Density** | J |  | A/m2 |  |  |
| **Electric Potential / Electromotive Force (EMF)** | V, E | Volt (V) | W/A |  |  |
| **Electric Field** | E |  | V/m |  |  |
| **Electric Flux** | Ie |  | V • m |  |  |
| **Electric Resistance** | R | Ohm (Ω) | V/A |  |  |
| **Electric Capacitance** | C | Farad (F) | C/V |  |  |
| **Electric Field Strength** | E |  | V/m  N/C |  |  |
| **Magnetic Flux** | φB | Weber (Wb) | V • s |  |  |
| **Magnetic Field / Flux Density** | B | Tesla (T) | Wb/m2 |  |  |
| **Magnetic Induction** | Im | Henry (H) | N/A • m  Wb/A |  |  |
| **Illumination** | lx | Lux (Lx) | lum/m2 |  |  |
| **Luminous Flux** | Φ | Lumen (Lm) | J/s |  |  |

**Unit Prefixes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Prefix** | **Symbol** | **Factor** | **Power** | **English** |
| **googolplex-** |  | (too long) | 101000 | googolplex |
| **googol-** |  | (too long) | 10100 | googol |
| **yotta-** | Y | 1 000 000 000 000 000 000 000 000 | 1024 | septillion |
| **zetta-** | Z | 1 000 000 000 000 000 000 000 | 1021 | sextillion |
| **exa-** | E | 1 000 000 000 000 000 000 | 1018 | quintillion |
| **peta-** | P | 1 000 000 000 000 000 | 1015 | quadrillion |
| **tera-** | T | 1 000 000 000 000 | 1012 | trillion |
| **giga-** | G | 1 000 000 000 | 109 | billion |
| **mega-** | M | 1 000 000 | 106 | million |
| **kilo-** | k | 1 000 | 103 | thousand |
| **hector-** | h | 100 | 102 | hundred |
| **deca-** | da | 10 | 101 | ten |
| **(none)** | (none) | 1 | 100 | one |
| **deci-** | d | 0.1 | 10−1 | tenth |
| **centi-** | c | 0.01 | 10−2 | hundredth |
| **milli-** | m | 0.001 | 10−3 | thousandth |
| **micro-** | μ | 0.000 001 | 10−6 | millionth |
| **nano-** | n | 0.000 000 001 | 10−9 | billionth |
| **pico-** | p | 0.000 000 000 001 | 10−12 | trillionth |
| **femto-** | f | 0.000 000 000 000 001 | 10−15 | quadrillionth |
| **atto-** | a | 0.000 000 000 000 000 001 | 10−18 | quintillionth |
| **zepto-** | z | 0.000 000 000 000 000 000 001 | 10−21 | sextillionth |
| **yocto-** | y | 0.000 000 000 000 000 000 000 001 | 10−24 | septillionth |
| **Googolth-** |  | (too long) | 10−100 | googolth |
| **Googolplexth-** |  | (too long) | 10−1000 | googolplexth |