

FUNDAMENTAL CONSTANTS

| Quantity | Symbol | Value* |
|----------------------------------|--------------|---|
| Avogadro's number | N_A | $6.022\,1367 \times 10^{23} \text{ mol}^{-1}$ |
| Boltzmann's constant | k | $1.380\,658 \times 10^{-23} \text{ J/K}$ |
| Electron charge magnitude | e | $1.602\,177\,33 \times 10^{-19} \text{ C}$ |
| Permeability of free space | μ_0 | $4\pi \times 10^{-7} \text{ T}\cdot\text{m/A}$ |
| Permittivity of free space | ϵ_0 | $8.854\,187\,817 \times 10^{-12} \text{ C}^2/(\text{N}\cdot\text{m}^2)$ |
| Planck's constant | h | $6.626\,0755 \times 10^{-34} \text{ J}\cdot\text{s}$ |
| Mass of electron | m_e | $9.109\,3897 \times 10^{-31} \text{ kg}$ |
| Mass of neutron | m_n | $1.674\,9286 \times 10^{-27} \text{ kg}$ |
| Mass of proton | m_p | $1.672\,6231 \times 10^{-27} \text{ kg}$ |
| Speed of light in vacuum | c | $2.997\,924\,58 \times 10^8 \text{ m/s}$ |
| Universal gravitational constant | G | $6.672\,59 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$ |
| Universal gas constant | R | $8.314\,510 \text{ J}/(\text{mol}\cdot\text{K})$ |

* 1986 CODATA recommended values.

USEFUL PHYSICAL DATA

| | |
|---------------------------------------|---|
| Acceleration due to earth's gravity | $9.80 \text{ m/s}^2 = 32.2 \text{ ft/s}^2$ |
| Atmospheric pressure at sea level | $1.013 \times 10^5 \text{ Pa} = 14.70 \text{ lb/in.}^2$ |
| Density of air (0 °C, 1 atm pressure) | 1.29 kg/m^3 |
| Speed of sound in air (20 °C) | 343 m/s |
| Water | |
| Density (4 °C) | $1.000 \times 10^3 \text{ kg/m}^3$ |
| Latent heat of fusion | $3.35 \times 10^5 \text{ J/kg}$ |
| Latent heat of vaporization | $2.26 \times 10^6 \text{ J/kg}$ |
| Specific heat capacity | $4186 \text{ J}/(\text{kg}\cdot\text{C}^\circ)$ |
| Earth | |
| Mass | $5.98 \times 10^{24} \text{ kg}$ |
| Radius (equatorial) | $6.38 \times 10^6 \text{ m}$ |
| Mean distance from sun | $1.50 \times 10^{11} \text{ m}$ |
| Moon | |
| Mass | $7.35 \times 10^{22} \text{ kg}$ |
| Radius (mean) | $1.74 \times 10^6 \text{ m}$ |
| Mean distance from earth | $3.85 \times 10^8 \text{ m}$ |
| Sun | |
| Mass | $1.99 \times 10^{30} \text{ kg}$ |
| Radius (mean) | $6.96 \times 10^8 \text{ m}$ |

SI UNITS

| Quantity | Name of Unit | Symbol | Expression in Terms of Other SI Units | Quantity | Name of Unit | Symbol | Expression in Terms of Other SI Units |
|----------------------|--------------|--------|---------------------------------------|------------------------|--------------|----------|---------------------------------------|
| Length | meter | m | Base unit | Viscosity | — | — | Pa·s |
| Mass | kilogram | kg | Base unit | Electric charge | coulomb | C | A·s |
| Time | second | s | Base unit | Electric field | — | — | N/C |
| Electric current | ampere | A | Base unit | Electric potential | volt | V | J/C |
| Temperature | kelvin | K | Base unit | Resistance | ohm | Ω | V/A |
| Amount of substance | mole | mol | Base unit | Capacitance | farad | F | C/V |
| Velocity | — | — | m/s | Inductance | henry | H | V·s/A |
| Acceleration | — | — | m/s ² | Magnetic field | tesla | T | N·s/(C·m) |
| Force | newton | N | kg·m/s ² | Magnetic flux | weber | Wb | T·m ² |
| Work, energy | joule | J | N·m | Specific heat capacity | — | — | J/(kg·K) or J/(kg·C°) |
| Power | watt | W | J/s | Thermal conductivity | — | — | J/(s·m·K) or J/(s·m·C°) |
| Impulse, momentum | — | — | kg·m/s | Entropy | — | — | J/K |
| Plane angle | radian | rad | m/m | Radioactive activity | becquerel | Bq | s ⁻¹ |
| Angular velocity | — | — | rad/s | Absorbed dose | gray | Gy | J/kg |
| Angular acceleration | — | — | rad/s ² | Exposure | — | — | C/kg |
| Torque | — | — | N·m | | | | |
| Frequency | hertz | Hz | s ⁻¹ | | | | |
| Density | — | — | kg/m ³ | | | | |
| Pressure, stress | pascal | Pa | N/m ² | | | | |

THE GREEK ALPHABET

| | | | | | | | | |
|---------|----------|------------|---------|-----------|-----------|---------|----------|------------|
| Alpha | A | α | Iota | I | ι | Rho | P | ρ |
| Beta | B | β | Kappa | K | κ | Sigma | Σ | σ |
| Gamma | Γ | γ | Lambda | Λ | λ | Tau | T | τ |
| Delta | Δ | δ | Mu | M | μ | Upsilon | Y | υ |
| Epsilon | E | ϵ | Nu | N | ν | Phi | Φ | ϕ |
| Zeta | Z | ζ | Xi | Ξ | ξ | Chi | X | χ |
| Eta | H | η | Omicron | O | o | Psi | Ψ | ψ |
| Theta | Θ | θ | Pi | Π | π | Omega | Ω | ω |