**Harold’s Physics Formulas**

**Cheat Sheet**

29 September 2025

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|  | **Mechanics:**  **Linear Translation** | **Mechanics:**  **Angular / Rotational Motion** | **Electricity / Magnetism** | **Fluid Mechanics / Thermodynamics** | **Atomic and Nuclear /**  **Waves and Optics** |
| **Kinematics** |  |  | [Harold’s Physics Units of Measure](https://www.toomey.org/tutor/harolds_cheat_sheets/Harolds_Physics_Units_Cheat_Sheet.pdf) |  |  |
| **Position**  **(m)**  (rad) | *Horizontal:*  *Vertical:* | *Circular:* |  | *Fluid Mechanics:*  *(Conservation of Mass)* | *Optics:*  ***Refraction:***  *(bend)*  *Snell’s Law:*  ***Diffraction:***  *(spread out)* |
|  | |
| *Waves:* | | *Optics*: |
| **Velocity**  **(m/s)**  Angular Velocity / Angular Frequency  (rad/s) |  | *Spring:*  *Pendulum:* | *Speed of Light:* | *Fluid Mechanics:* | *Waves and Optics:*  ***Reflection****:*  *(throwback)*  *Critical angle:*  *Maxima for a thin film:* |
|  | |
| **Acceleration**  **(m/)**  (rad/) | *Linear:*  *Tangential (linear):* | *Angular:*  *Centripetal (center):* | ***Constants:***  *Gravitational Constant*  *Gravity Acceleration (Earth)*  *Speed of Light in Vacuum*  *Electron-Volt*  *Charge of an Electron*  *Mass of an Electron*  *Mass of a Proton*  *Mass of a Neutron*  *Electric Permittivity*  *Magnetic Permeability*  *Avogadro’s Number*  *Boltzmann Constant*  *Coulomb Constant*  *Faraday Constant*  *Planck’s Constant*  *Avogadro’s Number*  *Ideal Gas Constant*  *pi* | | |
| *Net:* | |
|  | |
| **Jerk (Jolt)**  **(m/)**  (rad/) |  |  |
| **Dynamics** |  |  |  |  |  |
| **Mass**  **(kg)**  /  Moment of Inertia  () | = actual mass  = effective mass |  |  | *Density:* | *Magnification:* |
| **Momentum**  **(kgm/s)**  () | *Conservation of Linear Momentum:*  *Elastic = bounce off*  *Inelastic = stick together* | *Conservation of Angular Momentum:* |  | *Fluid Mechanics:* | *Atomic and Nuclear:* |
| [Inelastic Collision: Definition, Formula, and Examples](https://www.sciencefacts.net/inelastic-collision.html) | | |
| **Force**  **(N = kgm/)**  **/**  **Torque**  (J = Nm) | *Hooke’s Law:*  Gravitational Force: |  | *Electricity:*  *Coulomb’s Law:*  *Magnetism:* | *Fluid Mechanics:*  *Universal Gas Law:* | *Strong Nuclear Force:*  *Weak Nuclear Force:*  *(Beta Decay)*  *where is an antineutrino* |
| **Impulse**  **(Ns)**  (Nms) |  |  | *Electricity:*  *Unit Impulse:*  *(Dirac Delta Function)*  *such that* | |  |
| **Yank**  **(N/)**  **/**  Rotatum  (J/s) |  |  |  |
| **Energy** |  |  |  |  |  |
| **Work**  **(J = Nm)** |  |  |  | *Thermodynamics:* |  |
| **Kinetic**  **Energy**  **(J)** | *Translational:* | *Rotational:* |  | *Fluid Mechanics:*  *Bernoulli’s Equation:*  *Thermodynamics:* | *Atomic and Nuclear:*  *Electron Energy Levels:*  *n = principal quantum number (1, 2, 3, etc.)* |
| **Potential**  **Energy**  **(J)** |  | *Coiled Spring:* |  | *Fluid Mechanics:*  *Continuity of Mass:*  *Continuity of Volume:*  Thermodynamics*:* | *Atomic and Nuclear:*  *Relativity:* |
| **Heat**  **Energy**  **(J)** | *Conservation of Energy:* | | | *Thermodynamics:* |  |
| **Power**  **(W)** |  |  |  |  |  |

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| **Engineering Application** | |  |  |  |  |
| **Period / Frequency**  **(Hz)** | *Kepler’s Third Law:* |  | *For:* |  | *Waves and Optics:*  *Doppler Effect:* |
| **Center**  **of Mass**  **(m)** | *where*  *and* |  | Center of Mass | | |
| **Rigid Bodies** | *(Down = ‘−‘)* | *(CW = ‘−‘)* | Figure is the schematics that shows the mass distribution for a passenger car with a wheelbase defined as d. The car has 52% of its weight on its front wheels, now circled and labeled Pivot (Ff) and 48% of its weight on the rear wheels (Fr) on level ground. Distance between the rear axle and the center of mass is x. Distance between the front axle and the center of mass (rw) is d - x. The entire length of the whole axis is labeled with the equation rR=d. | | |
| **Conservation Laws** | |  |  |  |  |
| **Fundamental Principle** | *Conservation of*  *Linear Momentum* | *Conservation of*  *Angular Momentum* | *Conservation of*  *Electric Charge* | *Conservation of*  *Mass (or Matter)* | *Conservation of*  *Energy* |
| **Discipline** | *Physics* | *Physics* | *Chemistry & Circuits* | *Chemistry & Fluid Mechanics* | *Physics* |
| **Formula** |  |  |  | *Bernoulli’s Equation:* |  |
|  | Conservation Laws | | | | |

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| **Electricity** | | | |
| **Terms** | **Formulas** |  | |
| **Electric Field**  **(V/m or N/C)** |  |  | *Gauss’s Law:* | |
| **Potential / Voltage**  **(V)** |  |  | Draw the symbol of battery | |
| **Current**  **(A)** |  |  |  | |
| **Circuits** |  | **Series** | **Parallel** | |
| **Circuit Terms** | capacitor and inductor |  |  | |
| **Resistance**  **(Ω)** |  |  |  | |
| **Inductance**  **(H)** |  |  |  | |
| **Capacitance**  **(F)** |  |  |  | |
| **Kirchhoff's Current Law (KCL)** | The algebraic sum of currents in a network of conductors meeting at a **point** (node) is zero. | | Kirchhoff’s Current Law (KCL) | Kirchhoff's Law | |
| **Kirchhoff's Voltage Law (KVL)** | The directed sum of the potential differences (voltages) around any closed **loop** is zero. | | Is there any proof of Kirchhoff's law of voltage and current? - Quora | |

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| **Magnetism** | | |
| **Term** | **Formulas** | **Laws** |
| **Magnetic**  **Field**  **(T)** |  | *Ampere’s Circuit Law:*  *Gauss’s Law for Magnetism:* |
| **Magnetic**  **Flux**  **(Wb)** |  | *Gauss’s Law for Magnetism:* |
| **EMF**  **(V)** |  | *Faraday’s Law of Induction:* |

**Sources**

* Wikipedia (2025).
  + SI derived unit. <https://en.wikipedia.org/wiki/SI_derived_unit>
  + Metric prefix. <https://en.wikipedia.org/wiki/Metric_prefix>