Formulas, Units, and Constants

**Physics Reference Sheet**

### Formulas

- **Average Speed:** \( \nu = \frac{\Delta x}{\Delta t} \)
- **Average Acceleration:** \( a = \frac{\Delta \nu}{\Delta t} \)
- **Uniformly Accelerated Motion:** \( \nu = \nu_0 + at \)
- **Accelerated Motion:** \( x = x_0 + \nu_0 t + \frac{1}{2} at^2 \)
- **Newton's Second Law:** \( F = ma \)
- **Centripetal Force:** \( F = \frac{mv^2}{r} \)
- **Law of Universal Gravitation:** \( F = \frac{Gm_1m_2}{r^2} \)
- **Force Due to Gravity:** \( F = w = mg \)
- **Work:** \( W = Fd \)
- **Kinetic Energy:** \( E = \frac{1}{2} mv^2 \)
- **Gravitational Potential Energy:** \( E = mgh \)

- **Momentum:** \( p = mv \)
- **Collision in One Dimension:** \[ m_1\nu_1 + m_2\nu_2 \]_{initial} = \[ m_1\nu_1 + m_2\nu_2 \]_{final}
- **Heat Energy:** \( Q = mc\Delta T \)
- **First Law of Thermodynamics:** \( \Delta U = Q - W_{(by\ the\ system)} \)
- **Work by a Heat Engine:** \( W = Q_H - Q_L \)
- **Change in Entropy:** \( \Delta S = \frac{Q}{T} \)
- **Wave Speed:** \( \nu = f\lambda \)
- **Current:** \( I = \frac{q}{t} \)
- **Ohm's Law:** \( V = IR \)
- **Power Dissipated in a DC Circuit:** \( P = IV \)
- **Power Dissipated through a Resistor:** \( P = I^2R \)

### Units

- **Force:** \( 1\ N = 1\ \frac{kg\ m}{s^2} \)
- **Energy:** \( 1\ J = 1\ N\ m \)
- **Power:** \( 1\ W = 1\ \frac{J}{s} \)

### Constants

- **Gravitational Constant:** \( G = 6.67 \times 10^{-11}\ \frac{N\ m^2}{kg^2} \)
- **Acceleration Due to Gravity:** \( g = 9.8\ \frac{m}{s^2} \)
- **Speed of Light in a Vacuum:** \( c = 3.00 \times 10^8\ \frac{m}{s} \)

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