

## Formulas

**Average Speed:**  $v = \frac{\Delta x}{\Delta t}$

**Uniformly Accelerated Motion:**  $v = v_o + at$

$$x = x_o + v_o t + \frac{1}{2} at^2$$

**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:**  $[m_1v_1 + m_2v_2]_{initial} = [m_1v_1 + m_2v_2]_{final}$

**Heat Energy:**  $Q = mc\Delta T$

**First Law of Thermodynamics:**  $\Delta U = Q + W_{(on\ the\ system)}$

$$\Delta U = Q - W_{(by\ the\ system)}$$

**Work by a Heat Engine:**  $W = Q_H - Q_L$

**Change in Entropy:**  $\Delta S = \frac{Q}{T}$

**Wave Speed:**  $v = f\lambda$

**Current:**  $I = \frac{q}{t}$

**Ohm's Law:**  $V = IR$

**Power Dissipated in a DC Circuit:**  $P = IV$

**Power Dissipated in a Resistor:**  $P = I^2R$

## Units

**Force:**  $1\text{ N} = 1 \frac{\text{kg m}}{\text{s}^2}$

**Energy:**  $1\text{ J} = 1\text{ N m}$

**Power:**  $1\text{ W} = 1 \frac{\text{J}}{\text{s}}$

## Constants

**Gravitational Constant:**  $G = 6.67 \times 10^{-11} \frac{\text{N m}^2}{\text{kg}^2}$

**Acceleration Due to Gravity:**  $g = 9.8 \frac{\text{m}}{\text{s}^2}$

**Speed of Light in a Vacuum:**  $c = 3.00 \times 10^8 \frac{\text{m}}{\text{s}}$