

# CLASSICAL MECHANICS LAWS

## SUMMARY

### Newton's First Law Law of Inertia

$$\sum F = 0 \Leftrightarrow dv/dt = 0$$

An object remains at rest or in uniform motion in a straight line unless acted upon by an external force.

### Newton's Second Law Fundamental Law

$$F = ma$$

The acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass.

### Newton's Third Law Action & Reaction

$$F_{A \rightarrow B} = -F_{B \rightarrow A}$$

Whenever one object exerts a force on a second object, the second object exerts an equal and opposite force on the first.

### Law of Universal Gravitation Gravity

$$F = G (m_1 m_2 / r^2)$$

Every point mass attracts every other point mass by a force acting along the line intersecting both points.

### Conservation of Energy First Law of Thermo

$$\Delta E = W + Q$$

Energy cannot be created or destroyed, only transformed from one form to another or transferred.

### Conservation of Momentum Linear Momentum

$$p = mv \mid \Delta p = 0$$

The total momentum of a closed system remains constant if no external forces act upon it.