AI Response:

Kinematics is a branch of classical mechanics that deals with the motion of objec

Key Concepts

1. **Displacement**: The change in position of an object. It has both magnitude a

2. **Distance**: The total length of the path traveled by an object, regardless of d

3. **Velocity**: The rate of change of displacement with respect to time. Velocity
   $$
   v = \frac{ds}{dt}
   $$
   where v is velocity, ds is the displacement, and dt is the change in

4. **Speed**: The rate of change of distance with respect to time. It is a scalar qu
   $$
   s = \frac{d}{dt}
   $$
   where s is speed and d is the distance traveled.

5. **Acceleration**: The rate of change of velocity with respect to time. It can be
   $$
   a = \frac{dv}{dt}
   $$
   where a is acceleration, dv is the change in velocity, and dt is the c

Basic Kinematic Equations

For uniformly accelerated motion, there are several key equations known as the

1. $v = u + at$
   - Where v is final velocity, u is initial velocity, a is acceleration, and

2. $s = ut + \frac{1}{2}at^2$
   - Where s is displacement.

3. $v^2 = u^2 + 2as$
   - This equation relates the final velocity, initial velocity, acceleration, and displa

4. $s = \frac{(u + v)}{2}t$
   - This equation calculates displacement using the average of initial and final ve

Types of Motion
- **Straight-line motion**: Kinematics can analyze one-dimensional motion along