Unit: Momentum

I. Impulse: \( \Sigma F \cdot t = I = \Delta p \)

II. Conservation of Momentum: if \( \Sigma F = 0 \), then \( \Delta p_{\text{total}} = 0 \)

III. Collisions: \( \Delta p_{\text{total}} = 0 \)
   
   A. Elastic: \( \Delta K = 0 \)
   
   B. Inelastic
   
   C. Perfectly Inelastic

IV. 2D Collisions: \( \Delta p_x = 0 \) and \( \Delta p_y = 0 \)
Two objects collide. Under what conditions are the final velocities both zero?
You are sitting at your desk and wish to close the door by throwing something at it. You have a bouncy ball and a sticky lump of clay. If both are the same mass, which should you throw?
A 3kg ball initially moving at 2m/s breaks apart into a 2kg piece and a 1kg piece. If the velocity of the 2kg piece is 8m/s, what is the velocity of the 1kg piece?
When is momentum conserved?
Momentum, Energy and Collisions

\[ p_{\text{total}} = p_{1i} + p_{2i} = p_{1f} + p_{2f} \]

When is energy conserved?