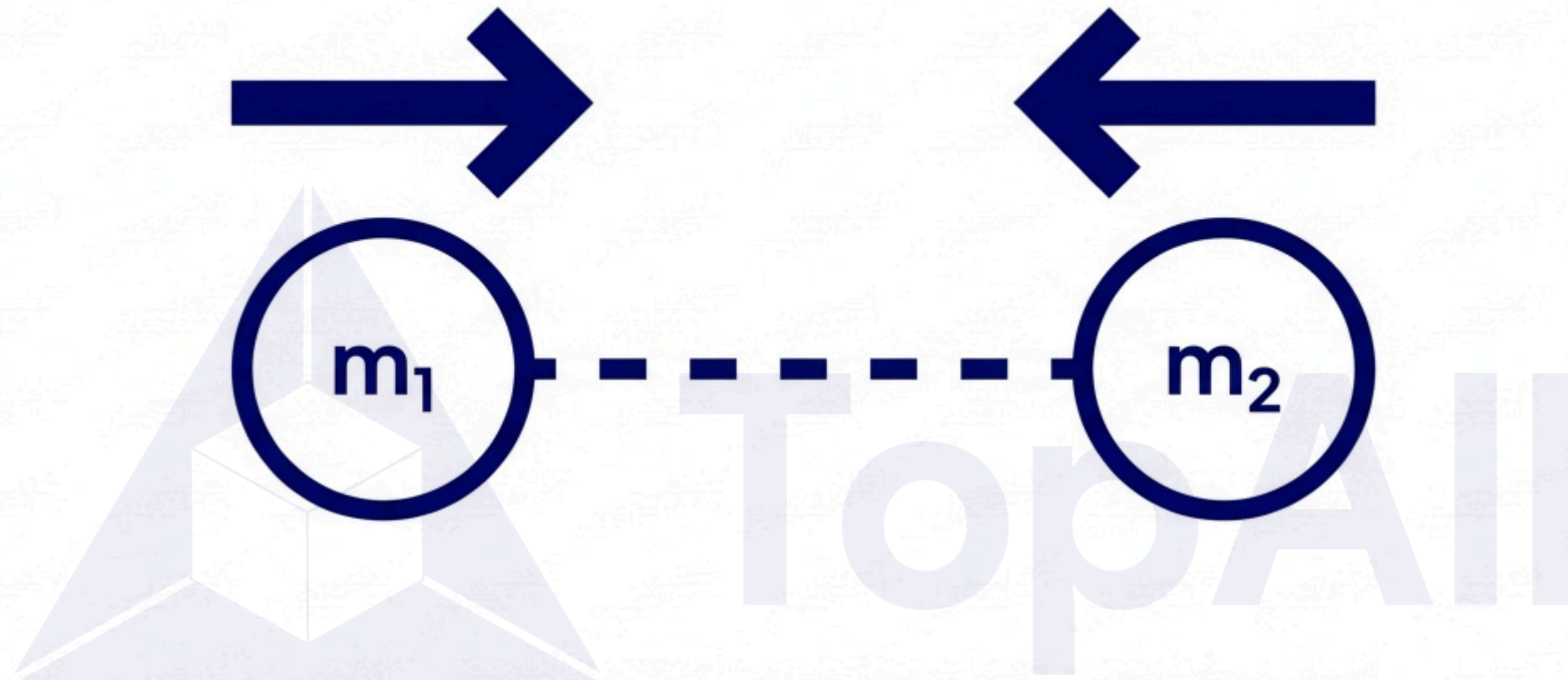


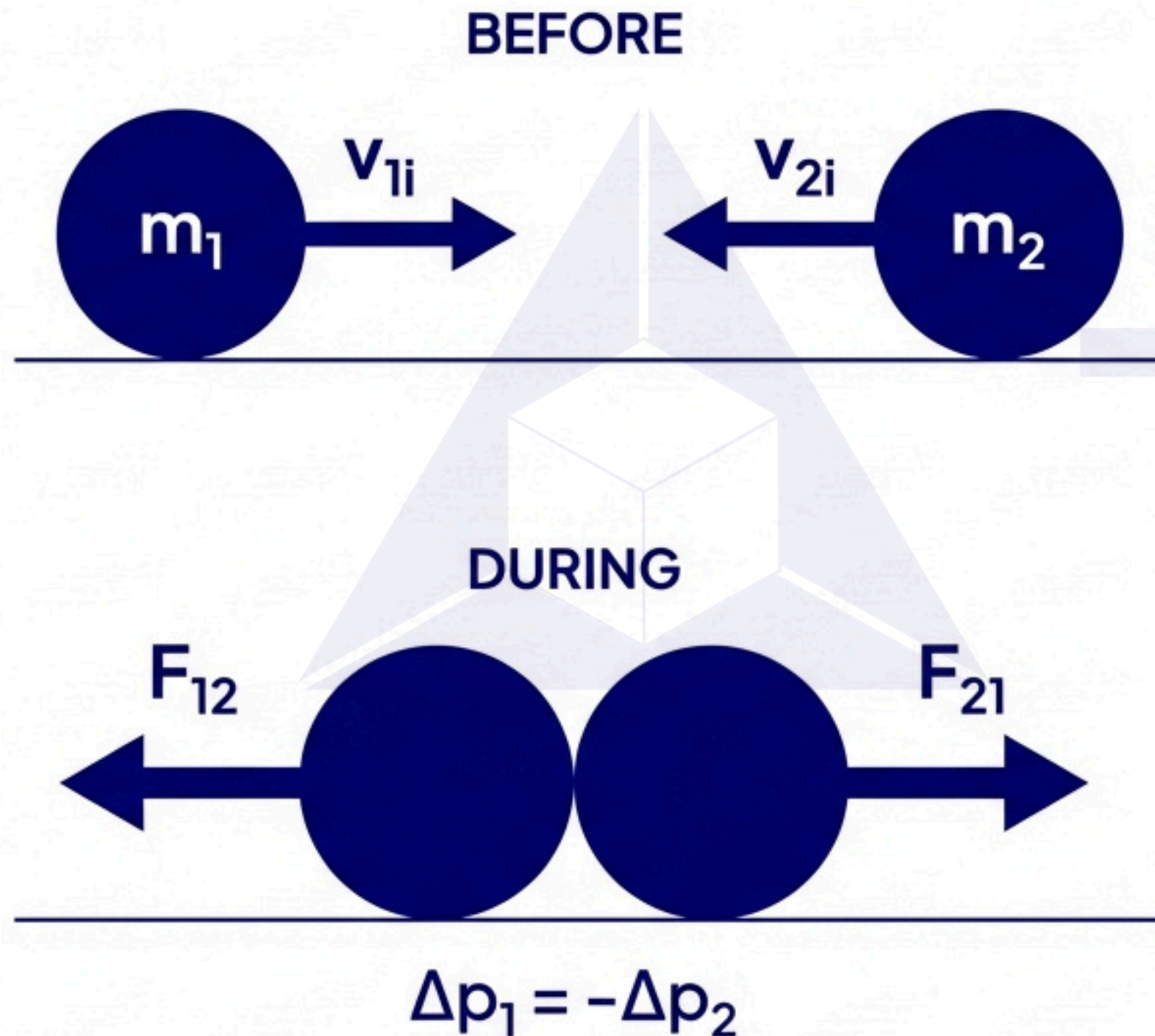


NEET/JEE PHYSICS ESSENTIALS • CHAPTER 5

Elastic and Inelastic Collisions

Understanding energy, momentum, and the physics of impact.

CAUSE AND EFFECT



THE UNIVERSAL RULE: MOMENTUM IS ALWAYS CONSERVED

During any isolated collision, mutual impulsive forces cause equal and opposite changes in momentum. Regardless of how the bodies deform, total momentum remains constant.

✓ **MOMENTUM: ALWAYS CONSERVED**

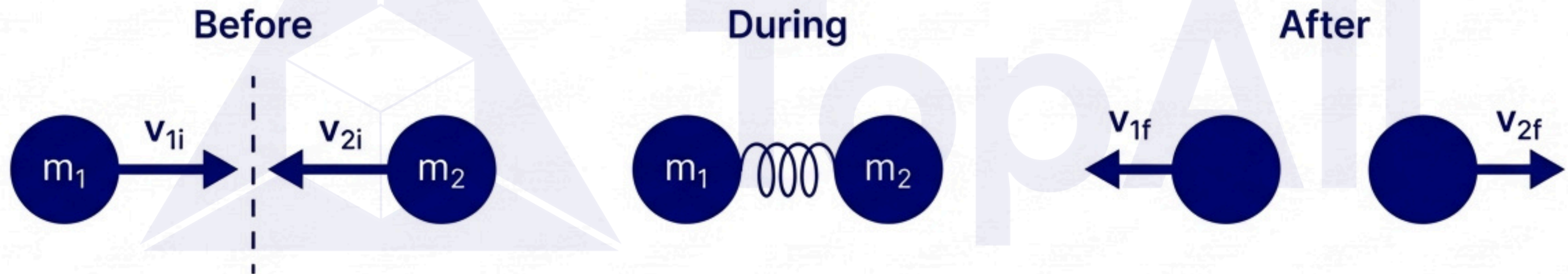
$$m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$$

Elastic Collisions: The Perfect Rebound

The “spring” connecting the masses regains its original shape without any loss in energy. No permanent deformation occurs, and no heat or sound is generated.

✓ MOMENTUM: CONSERVED

✓ KINETIC ENERGY: CONSERVED



$$K_i = K_f \rightarrow \frac{1}{2}m_1v_{1i}^2 + \frac{1}{2}m_2v_{2i}^2 = \frac{1}{2}m_1v_{1f}^2 + \frac{1}{2}m_2v_{2f}^2$$



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter

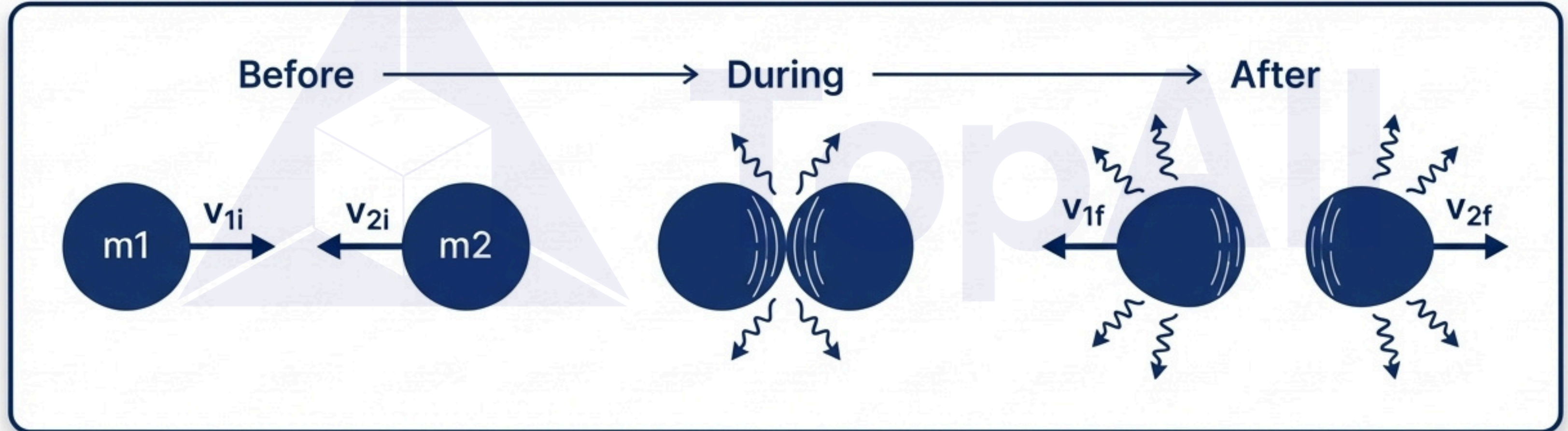


Inelastic Collisions: Deformation & Energy Loss

The most common type of real-world collision. Deformation is only partly relieved. Part of the initial kinetic energy is permanently transformed into heat and sound.

✓ **MOMENTUM: CONSERVED**

✗ **KINETIC ENERGY: NOT CONSERVED**



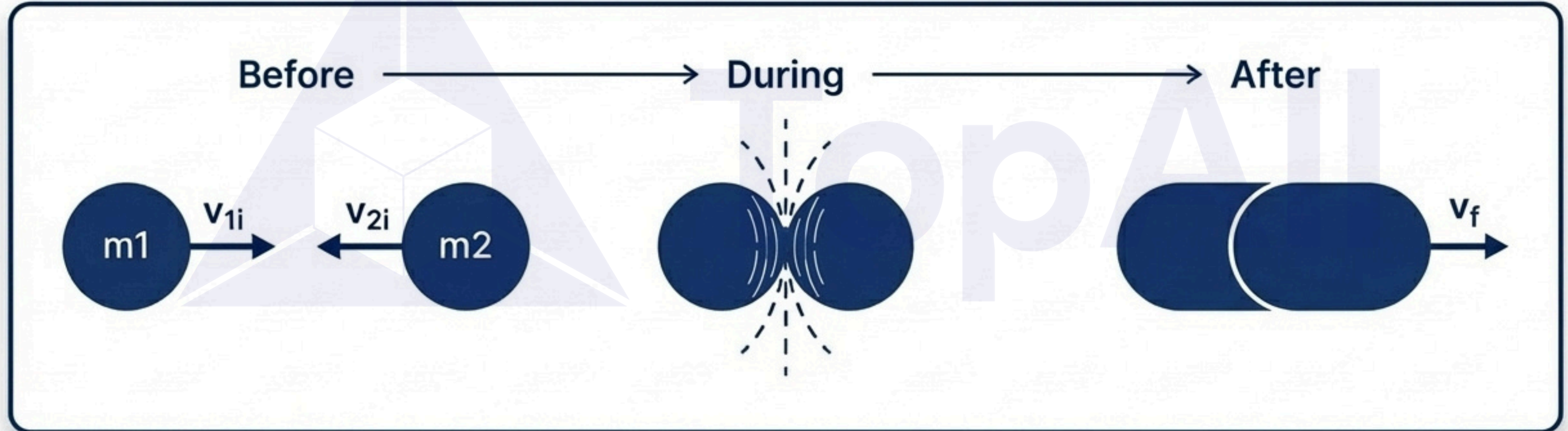
$K_f < K_i$ (Final Kinetic Energy is less than Initial)

Completely Inelastic Collisions: Sticking Together

The deformation is not relieved at all. The two colliding particles merge and move together as a single macroscopic body after impact, resulting in the maximum possible loss of kinetic energy.

✓ MOMENTUM: CONSERVED

✗ KINETIC ENERGY: MAXIMUM LOSS



$$m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2) v_f$$

Key Takeaways: Collision Matrix

COLLISION TYPE	MOMENTUM	KINETIC ENERGY	POST-COLLISION STATE
Elastic	✓ Conserved	✓ Conserved	Bodies separate perfectly, no deformation
Inelastic	✓ Conserved	✗ Partially Lost (Heat/Sound)	Bodies separate, some permanent deformation
Completely Inelastic	✓ Conserved	✗ Maximum Loss	Bodies stick together, share common velocity v_f

Remember: The total energy of the universe is always conserved; however, macroscopic Kinetic Energy is the specific metric that decreases during inelastic impacts.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis