

# Newton's Third Law and Momentum

Chapter 8: Force and Laws of Motion · Topic 2

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## Key Concept

When a gun is fired, the forward force propelling the bullet has an equal and opposite recoil force pushing the gun backward — this is Newton's Third Law in action. In any closed system with no external forces, total momentum is conserved before and after a collision, a principle called the Law of Conservation of Momentum, which explains phenomena like why a swimmer pushes water backward to move themselves forward, and is fundamental to understanding collisions in vehicle safety design.

## Quick Revision Notes

- Newton's Third Law: every action has an equal and opposite reaction.
- Momentum ( $p$ ) = mass  $\times$  velocity ( $p = mv$ ), a vector quantity.
- Law of Conservation of Momentum: total momentum in a closed system remains constant.
- A gun's recoil demonstrates Newton's Third Law in action.

## Practice Questions

- 1 Calculate the momentum of a 2kg object moving at 3 m/s.
- 2 Explain the recoil of a gun using Newton's Third Law.
- 3 State the Law of Conservation of Momentum in your own words.