

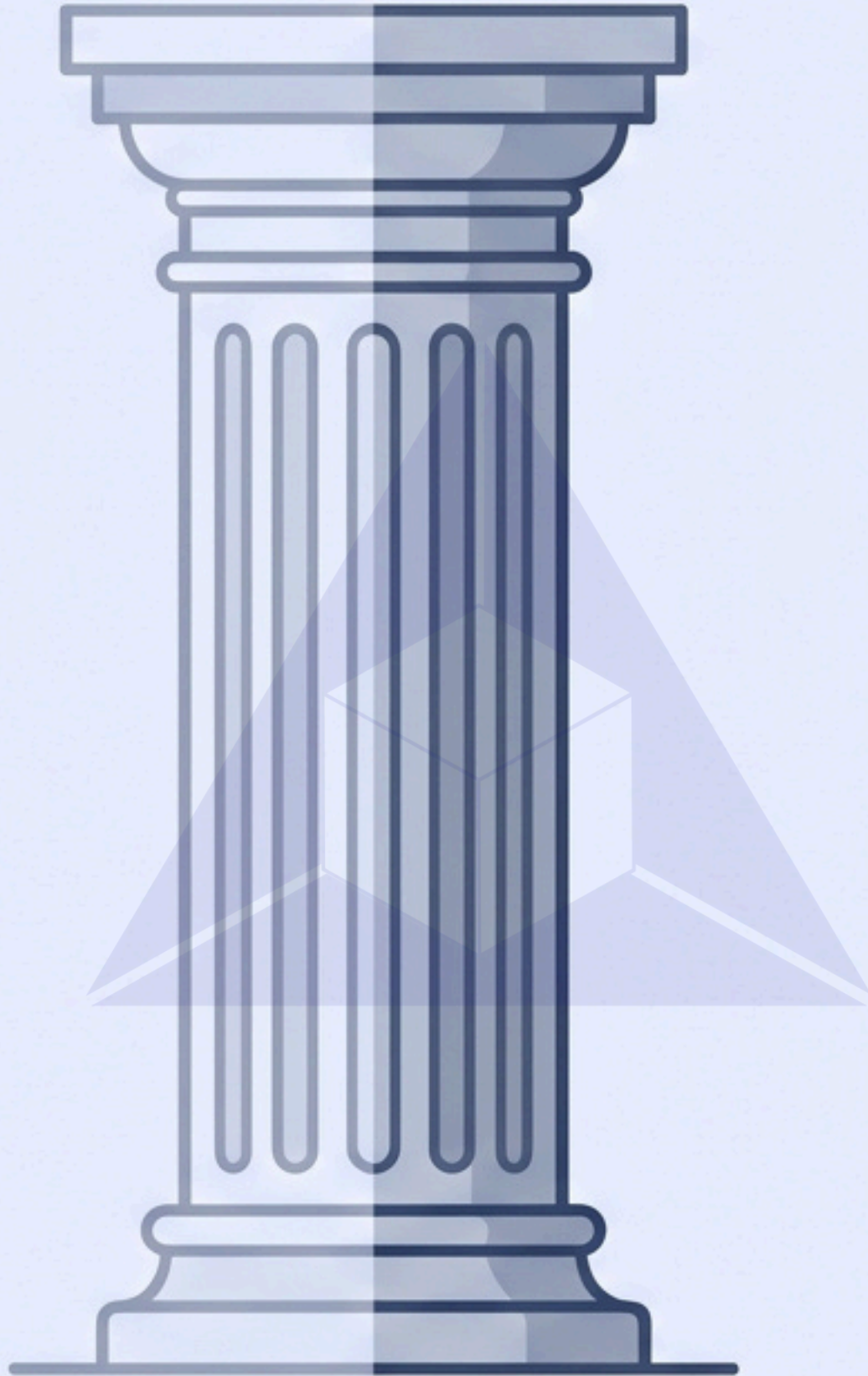
[CHAPTER 4: LAWS OF MOTION]

CLASS 11 PHYSICS • NEET/JEE PREP

# Aristotle's Fallacy

The hidden flaw in our 'common sense' view of motion—and how actual physics proves it wrong.

- The 2,000-year-old illusion
- The toy-car thought experiment
- Uncovering the hidden forces

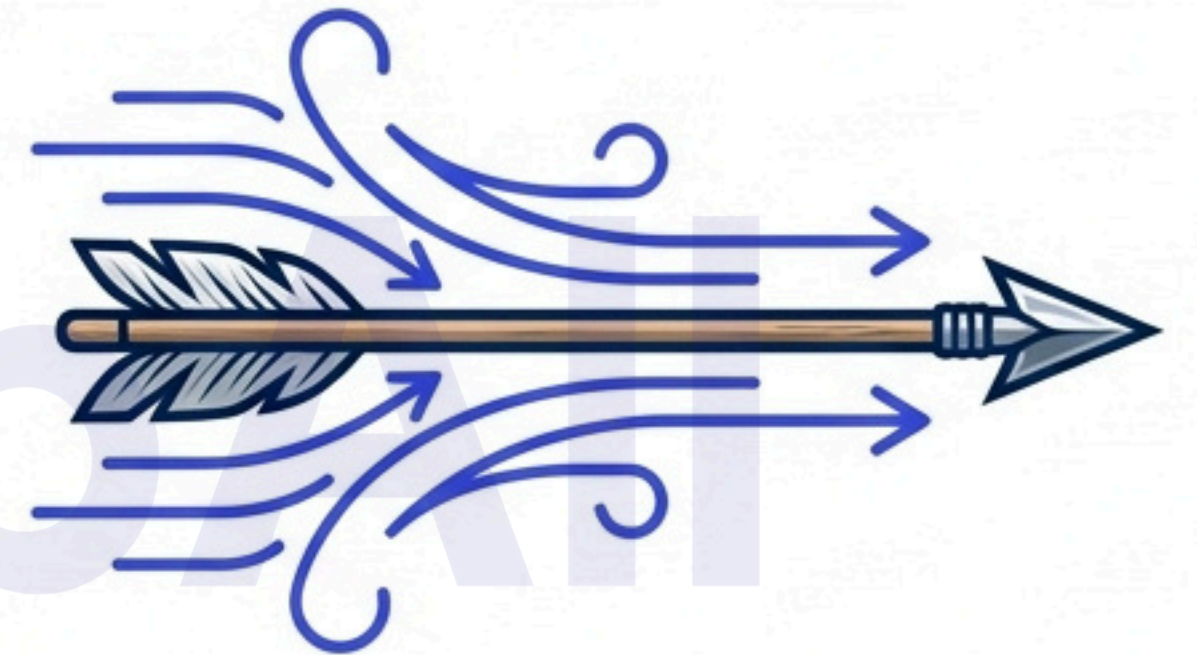


### [ARISTOTLE'S VIEW]

**“An external force is required to keep a body in motion.”**

The Greek thinker Aristotle (384–322 B.C.) believed that if a body is moving, something external must be actively pushing or pulling it at all times.

- His logic: An arrow keeps flying because the air behind it keeps pushing it forward.
- The implication: Left entirely alone, all objects will naturally come to rest.



# Why Does Aristotle's Flaw Make Sense?



**It perfectly matches daily terrestrial motion.**

In our everyday experience, things do stop moving when we stop pushing them.

- A rolling football eventually stops.
- A swinging tree branch comes to rest.
- A boat stops moving if you stop rowing.

**[COMMON SENSE]**

It seems obvious: no external force = no motion.



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# The Toy-Car Illusion

## The Ultimate "Proof" of Aristotle's Law

Imagine a child playing with a non-electric toy car on the floor.



[PULL FORCE]

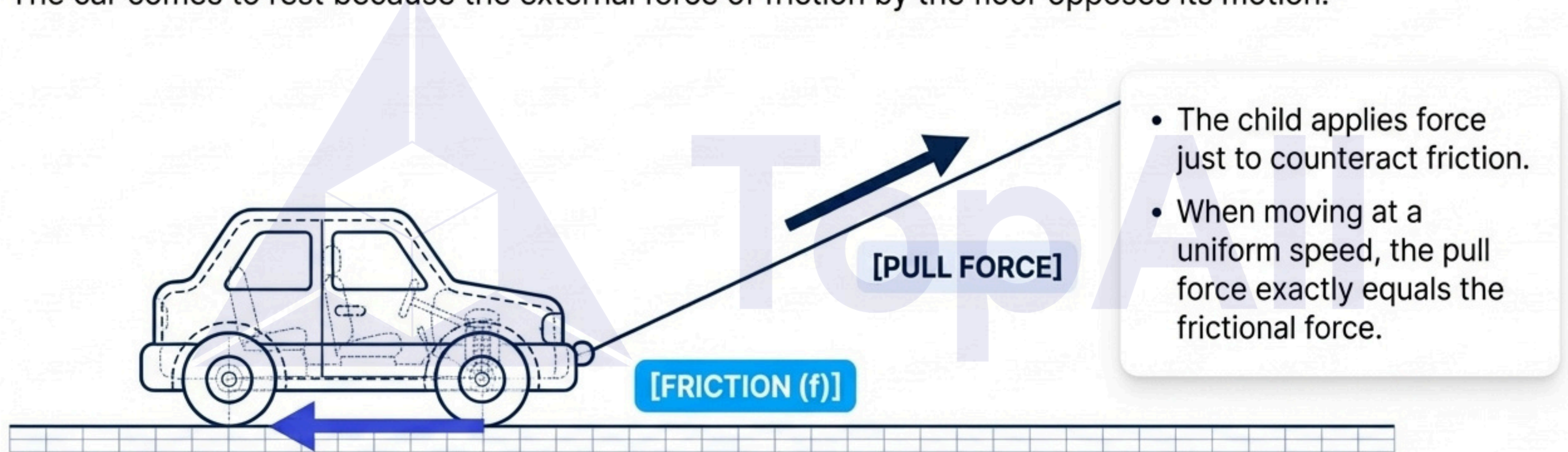
- To keep the car moving at a constant speed, the child must constantly drag the string.
- If the child releases the string (removes the force), the car stops.

**[OBSERVATION]** Force is applied → Car moves. Force is removed → Car stops.

# Uncovering the Hidden Opposing Force

## The Pull Force isn't creating motion—it's canceling friction.

The car comes to rest because the external force of friction by the floor opposes its motion.



$$[\text{NET FORCE} = F_{\text{pull}} - f_{\text{friction}} = 0]$$

# H1: Common Sense vs. Actual Physics



## H2: The Frictionless Universe

### ✗ THE FALLACY

- Force is required for uniform motion.
- Forces die out on their own.

### ✓ THE REALITY

- Zero net force = uniform motion.
- Friction acts as an invisible opposing force.



### [IDEALIZED CASE]

If we completely remove friction (like sliding on perfect ice), the child wouldn't need to pull the string at all. The car would roll forever.

# H1 Key Takeaways Plus Jakarta Sans



## Section 4.2 Summary

- **Aristotle's Error:** Believing that an external force is inherently required to keep a body in uniform motion.
- **The Hidden Variable: Natural opposing forces** (like friction or viscous drag) are always present on Earth, causing moving objects to stop.
- **The True Reality:** To maintain uniform motion in the real world, an external force is only needed to counteract friction, resulting in a Net Force of Zero.

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