

2.1 Introduction

Motion in a Straight Line



Everyday Action



Falling Leaves



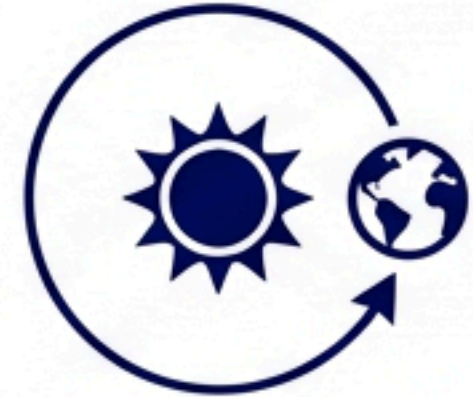
Flowing Water



Moving Car



Planetary Rotation



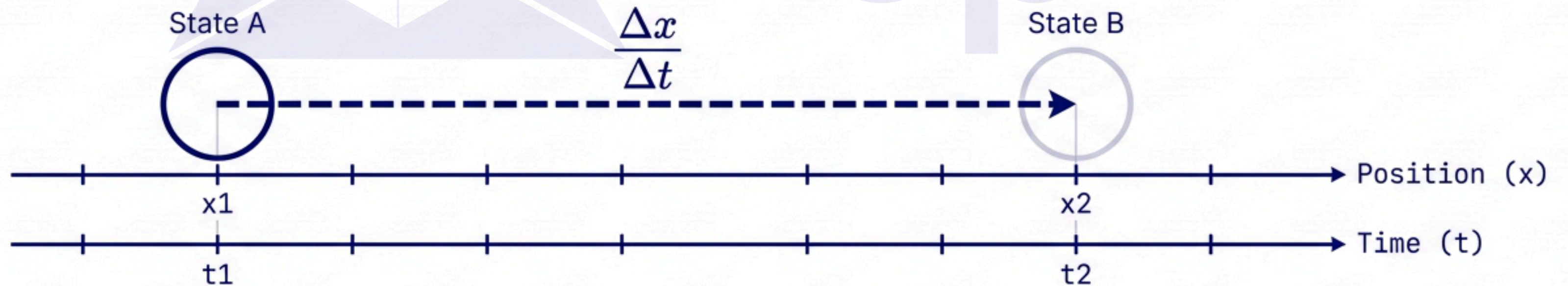
Cosmic Orbit

What Is Motion?

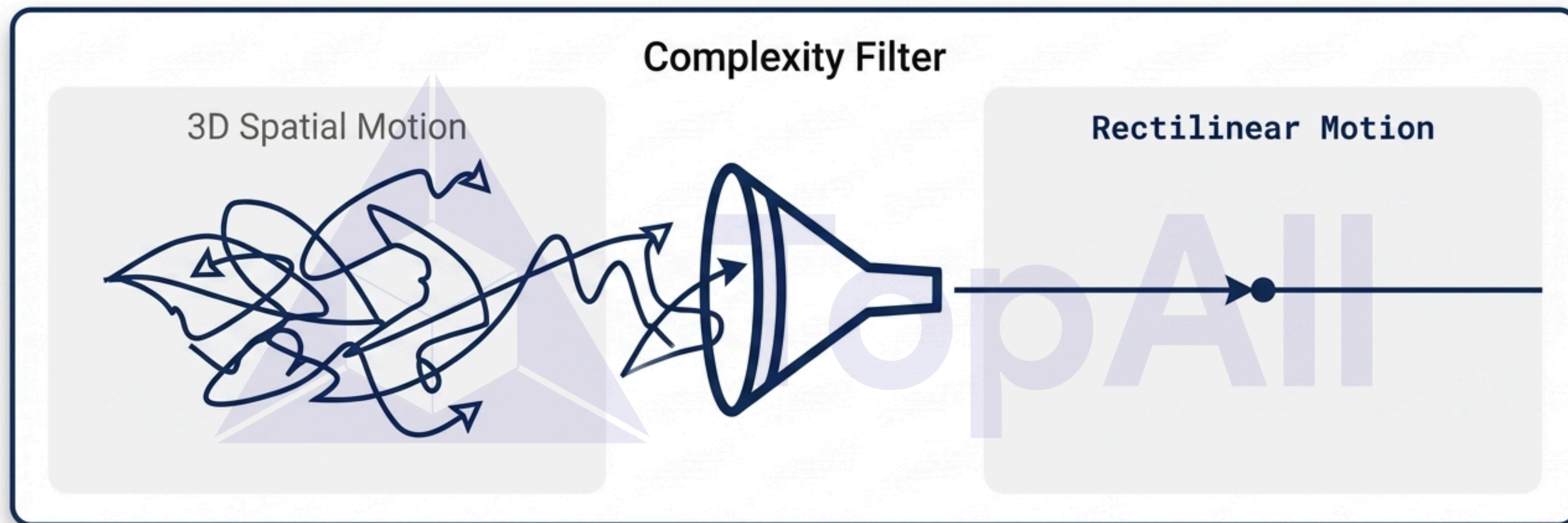
KEY DEFINITION

Motion is change in position of an object with time.

State A to State B



Why Study Straight-Line Motion First?



Before mapping complex paths, we must master the simplest case. **Rectilinear motion** (motion along a straight line) allows us to develop the foundational concepts of velocity and acceleration using simple equations.



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

$$E=mc^2$$



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Point Object Approximation

In kinematics, we treat objects in motion as point objects. This allows us to neglect the size of the object without much error.

APPROXIMATION RULE

Scale Contrast



Example: A car's physical dimensions are negligible when it travels a 200 km highway.

What Is Kinematics?

Kinematics is the branch of physics that describes motion **without discussing its causes**.

The Physics Boundary

Kinematics (Current Chapter)

How things move.

Key Variables

Position

Velocity

Acceleration



Dynamics (Chapter 4)

Why things move.

Key Variables

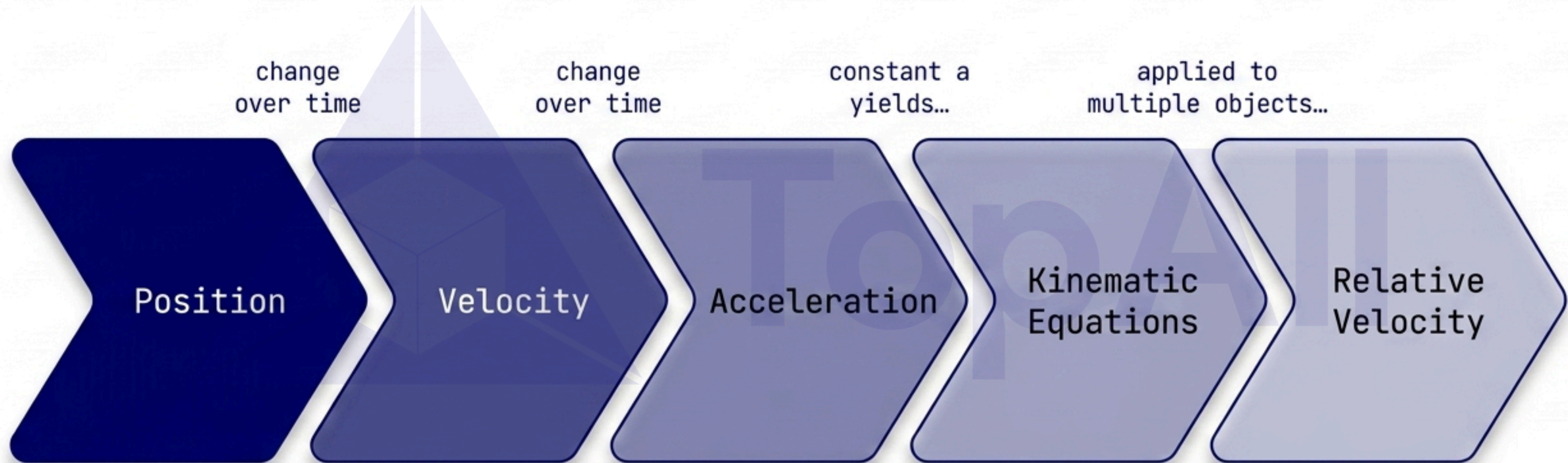
Force

Causes of Motion



We are only mapping the geometry of motion, not the forces behind it.

Chapter Roadmap



Every concept in Chapter 2 builds sequentially. Master the current node before moving to the next.



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