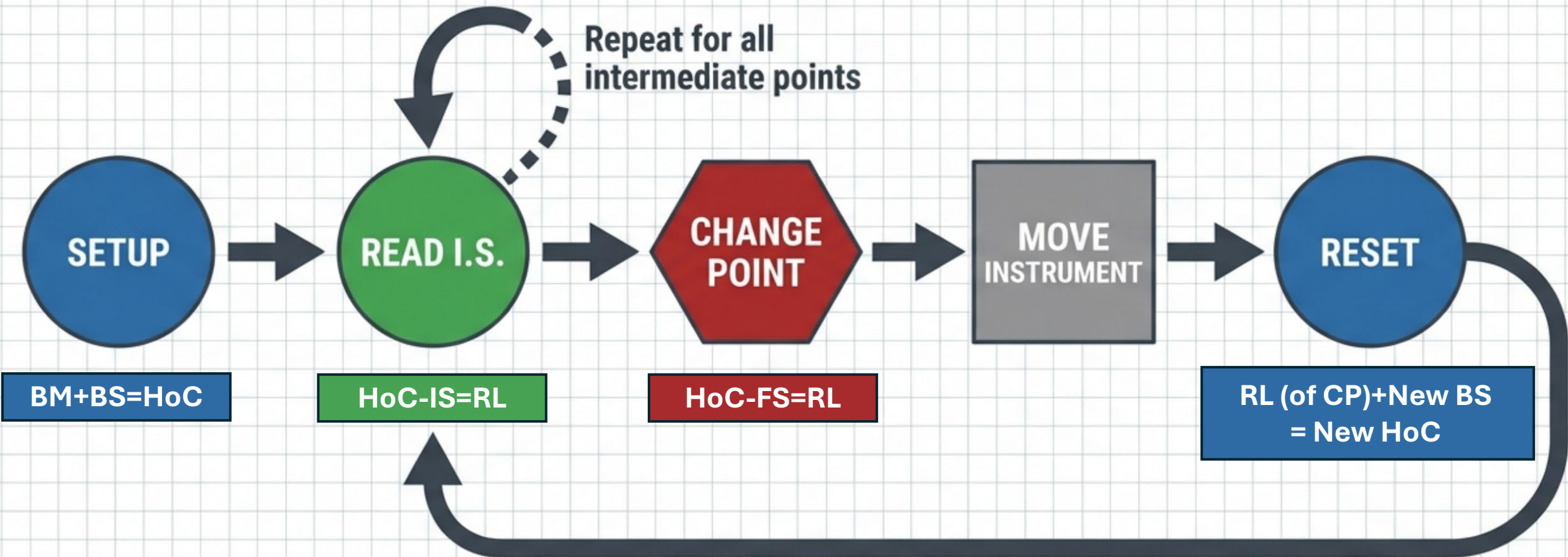


Height of Collimation Method



Rise and Fall Method

Concept: Instead of an absolute plane, we calculate the relative slope between steps.

Logic Rule:

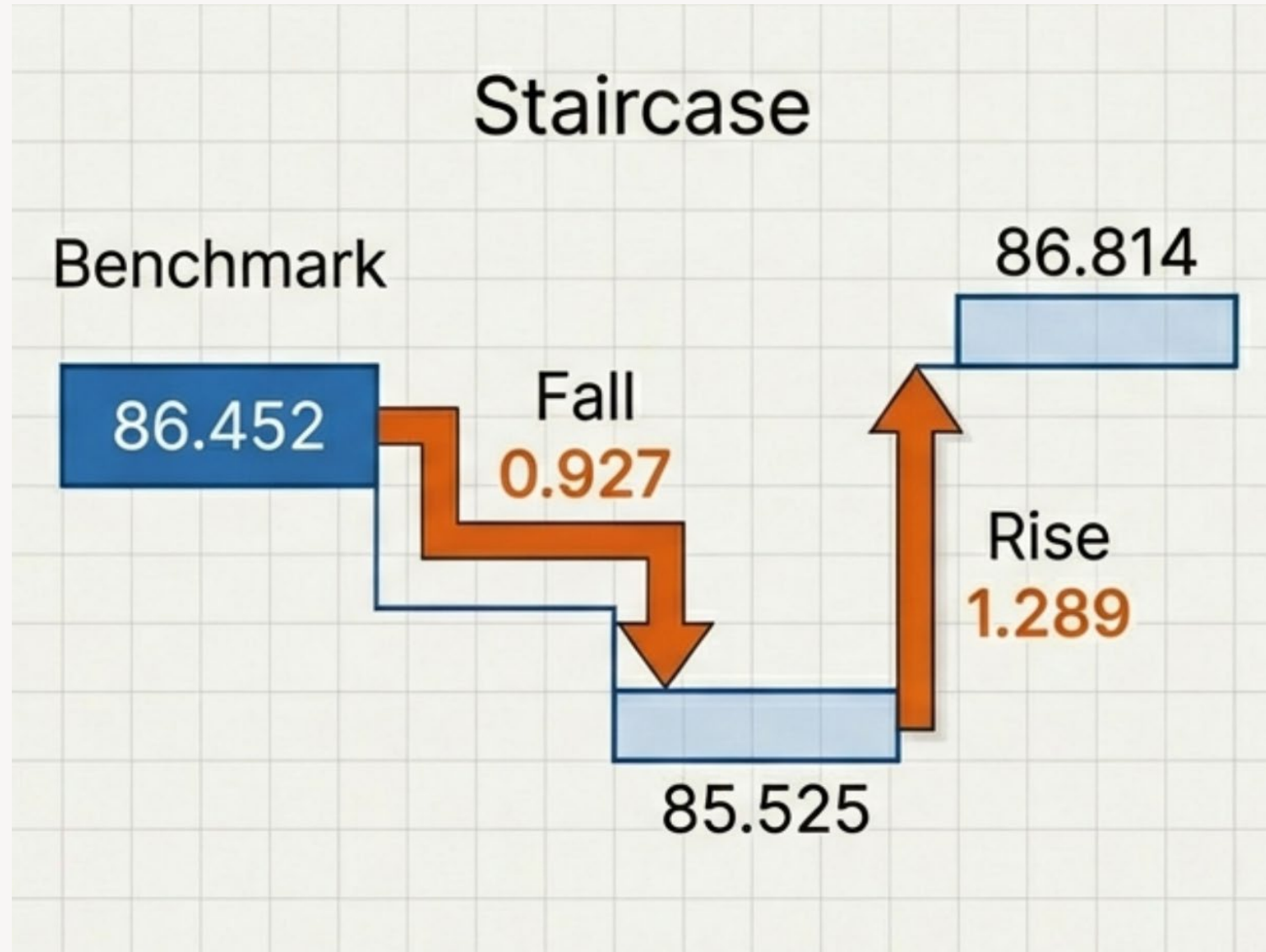


- Reading **Decreases** = Ground Goes **Up** (Rise Column)



- Reading **Increases** = Ground Goes **Down** (Fall Column)

Rise and Fall Method



The Sign Rule: Previous Reading - Current Reading

Fall Calculation

$$1.034_{(BS)} - 1.961_{(IS)} = -0.927$$



Negative result enters
Fall column as a
positive number.

Rise	Fall
	0.927 ✓

Rise Calculation

$$1.961_{(IS)} - 0.672_{(IS)} = +1.289$$

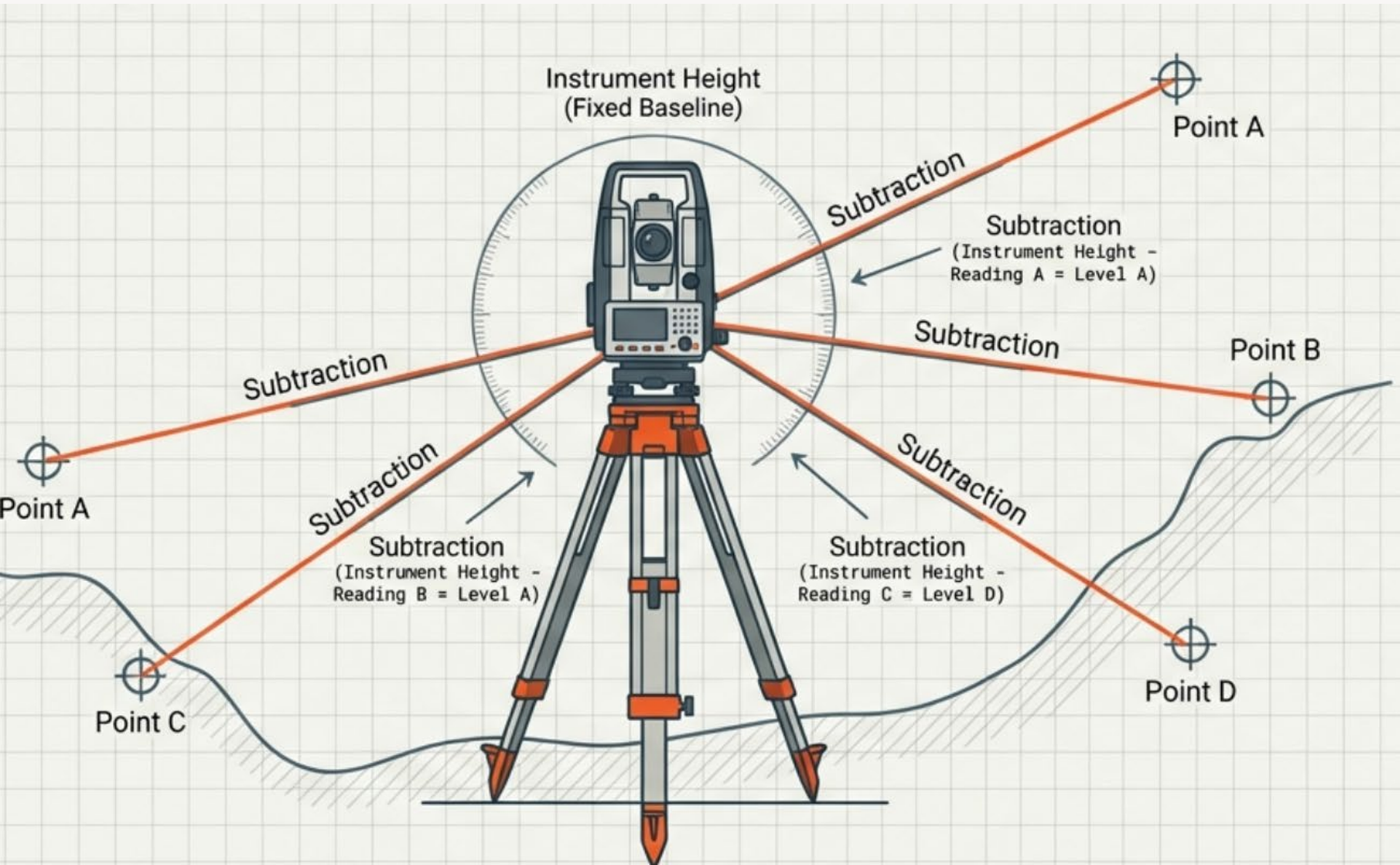


Rise	Fall
1.289 ✓	

Arithmetic Check

$$\sum Rises - \sum Falls = Last\ R.L - First\ R.L$$

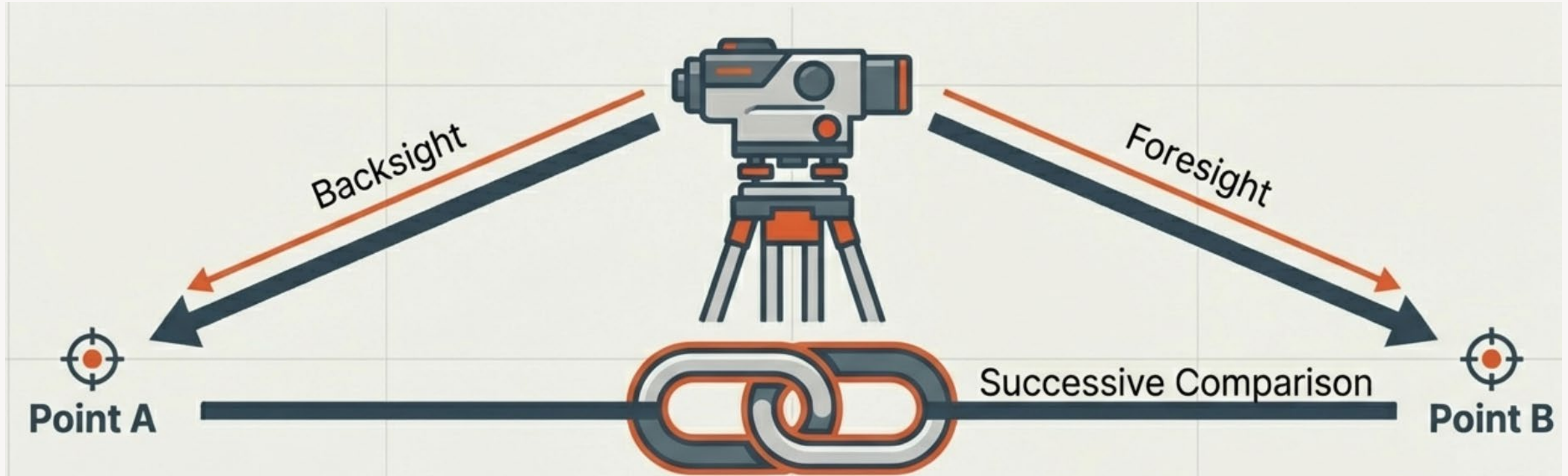
Height of Collimation Method



Core Mechanics

- **The Baseline:** Instrument Height is established once per setup.
- **The Calculation:** Levels found by subtracting readings directly from the fixed Instrument Height.
- **The Result:** Rapid acquisition of multiple points from a single stance without recalculating the baseline.

Rise and Fall Method



Successive Comparison

Determines elevation difference by comparing each reading directly to the previous one.

Continuous Audit

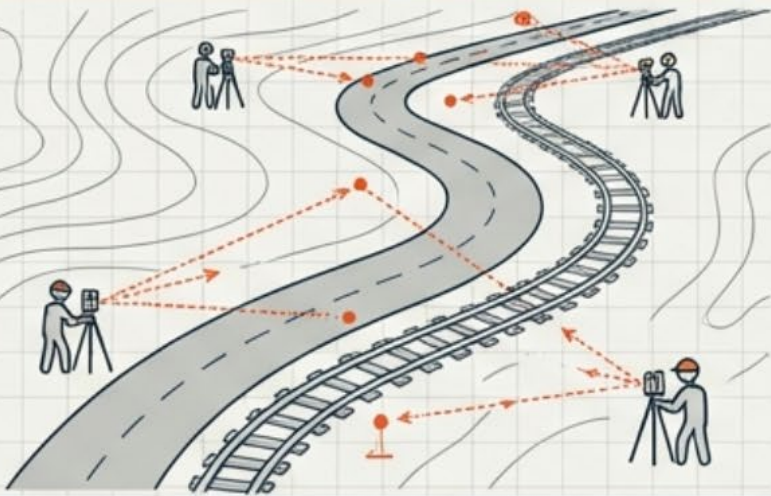
Every single reading is checked against the previous one.

The Result

A system inherently designed to determine specific rise or fall between consecutive points.

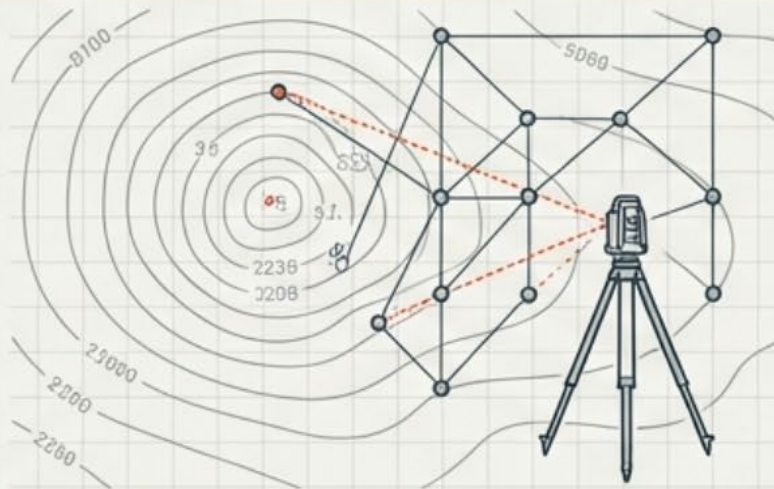
Height of Collimation Method

Route Surveys



Roads, railways, and pipelines.

Topographic Mapping



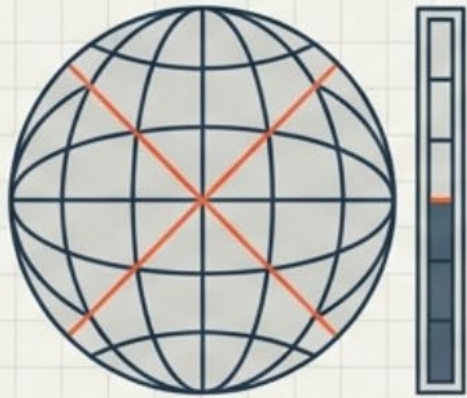
Generating contours and terrain models.

Preliminary Assessments



Initial site scouts before construction begins.

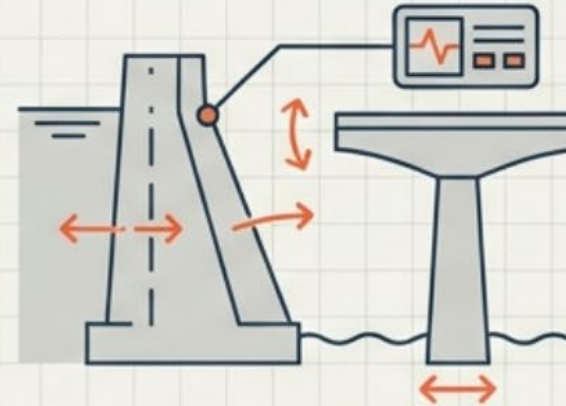
Rise and Fall Method



High-Precision Geodetic Leveling

Establishing primary control networks.

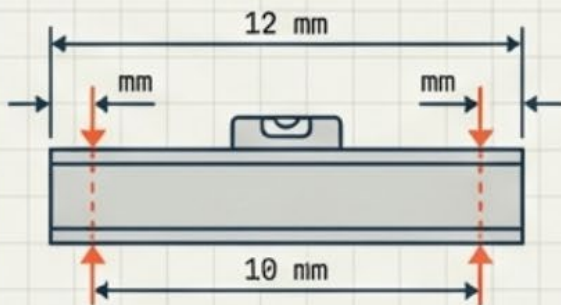
GEODETTIC | NETWORKS



Structural Monitoring

Detecting shifts in dams, bridges, or high-rises.

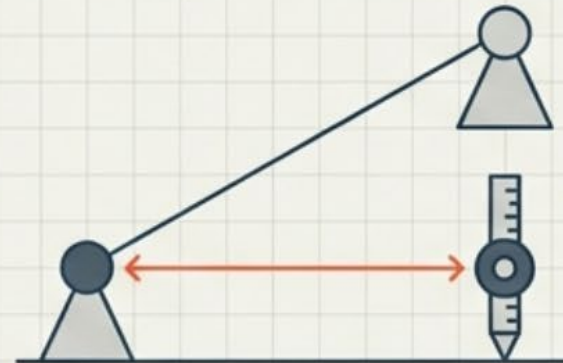
STRUCTURAL | INTEGRITY



Construction Tolerances

Setting out fine tolerances where every millimeter counts.

FINE | TOLERANCE



Short-Distance Leveling

Where accuracy value outweighs calculation time.

ACCURACY | VALUE

Define Project Constraints

Priority?

Meticulous Accuracy

Rapid Coverage

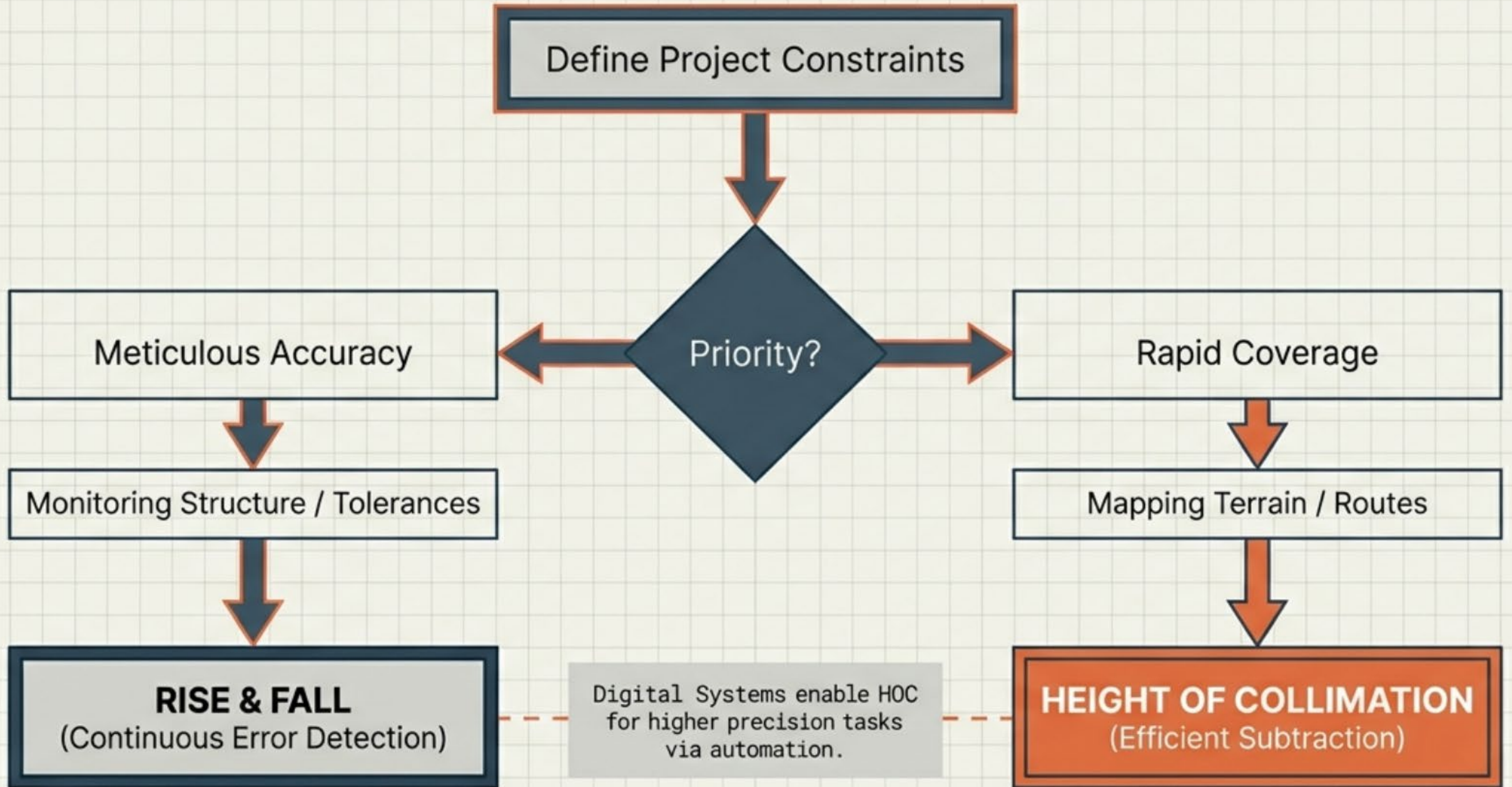
Monitoring Structure / Tolerances

Mapping Terrain / Routes

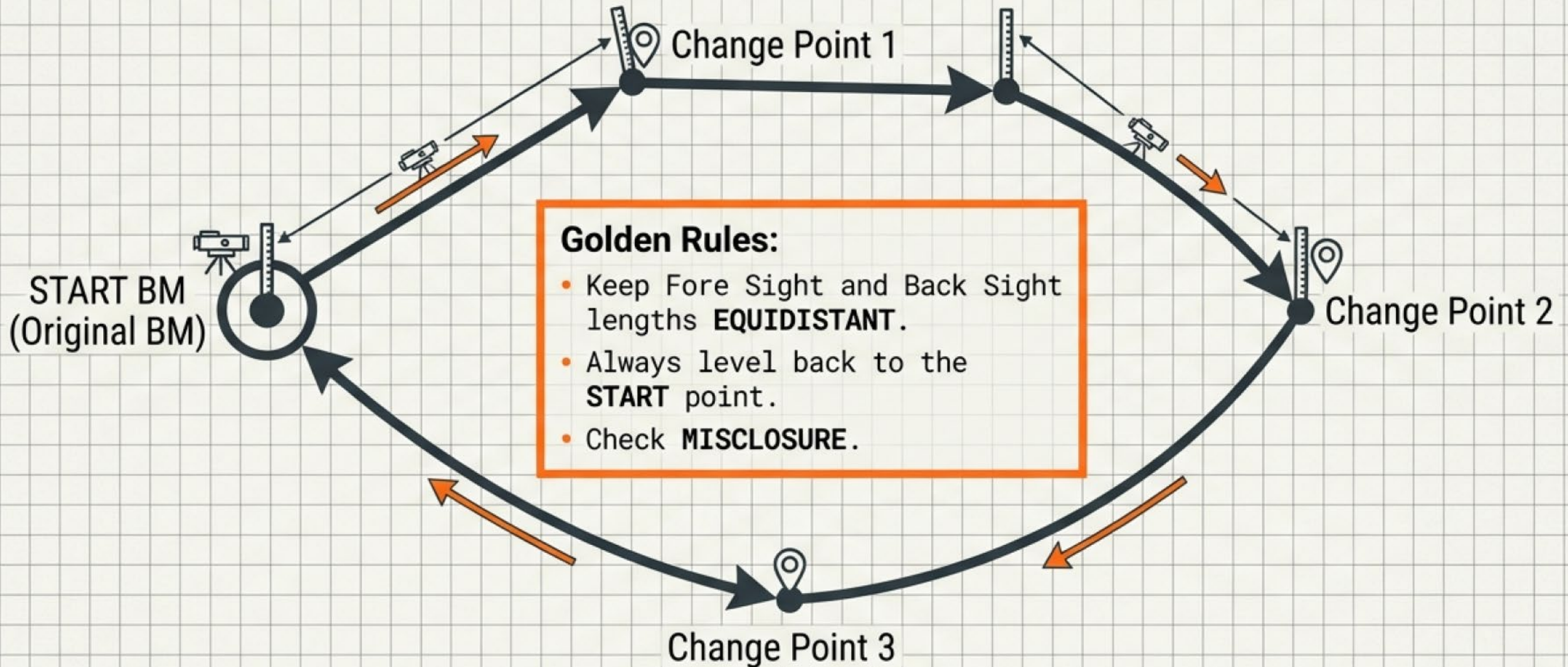
RISE & FALL
(Continuous Error Detection)

Digital Systems enable HOC
for higher precision tasks
via automation.

HEIGHT OF COLLIMATION
(Efficient Subtraction)

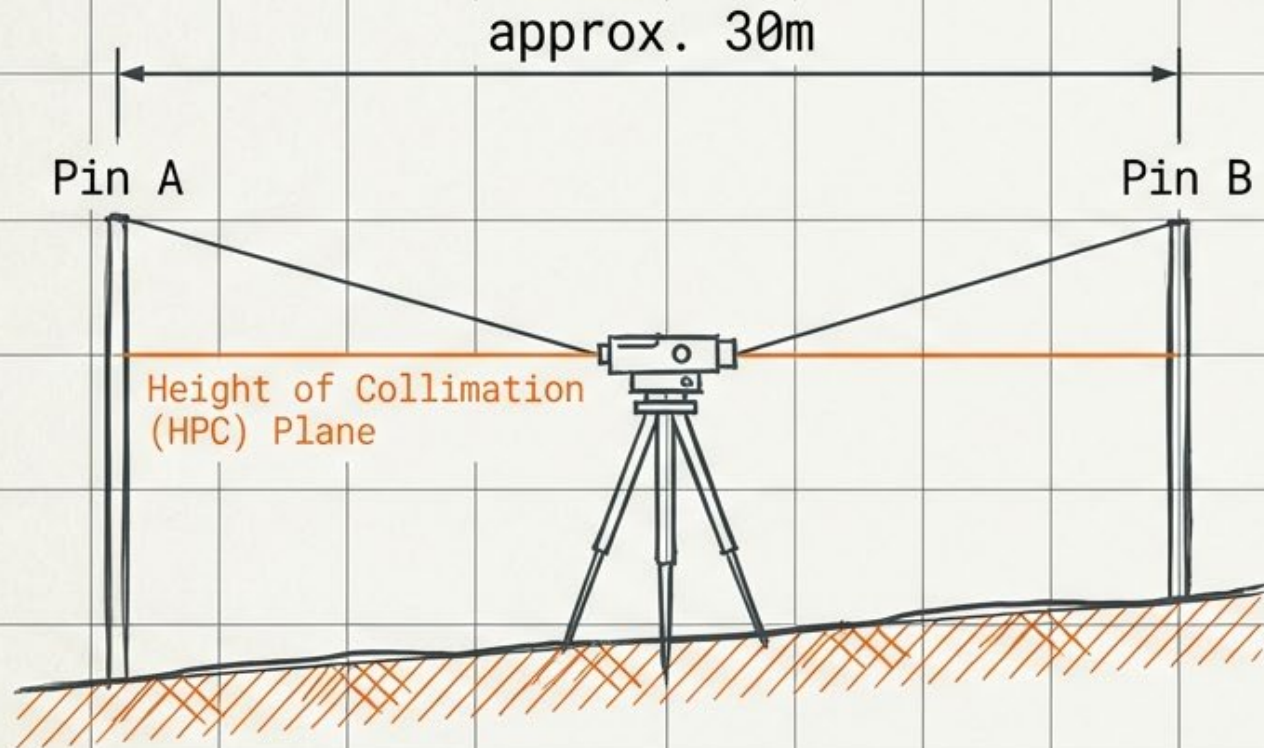


PROTOCOL: CLOSING THE LOOP



Tolerance: A few millimeters is expected. Adjust acceptable error in proportion to loop lengths.

CALIBRATION: THE TWO PEG TEST (STEP 1)

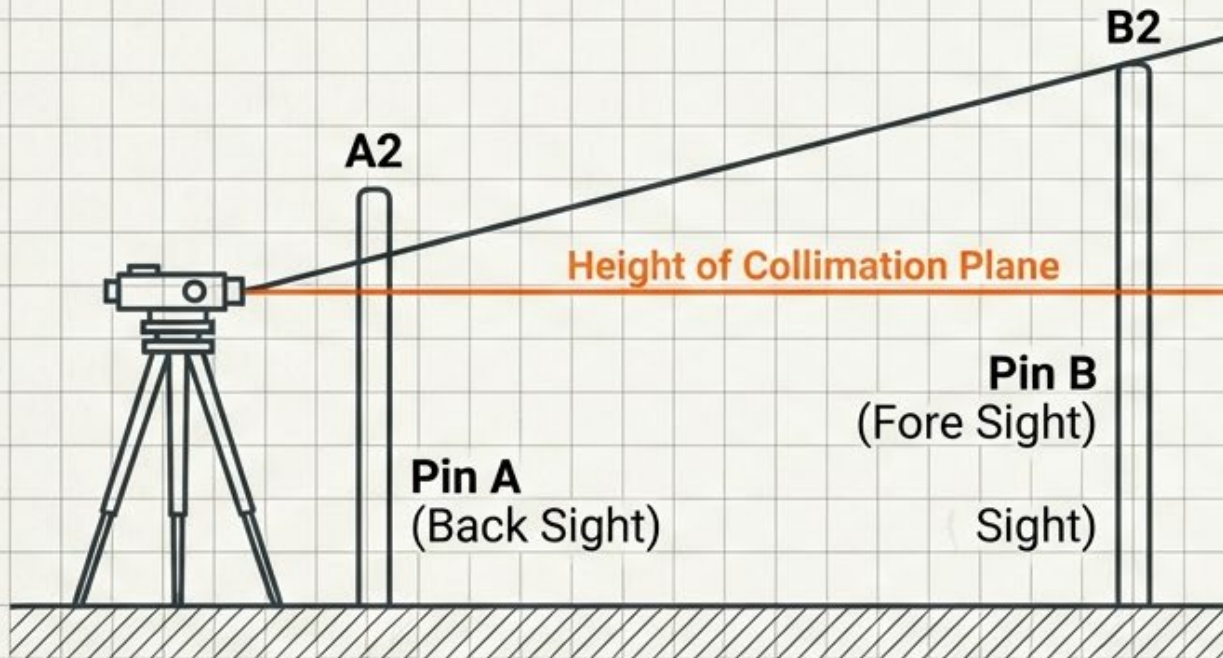


GOAL: Determine if the line of collimation is diverging from horizontal.

ACTION: Setup exactly midway. Measure difference between A and B.

LOGIC: Because distance is equal, errors cancel out. We now possess the TRUE difference in level.

CALIBRATION: THE TWO PEG TEST (STEP 2)



ACTION:

Move level adjacent to Pin A.
Retake readings.

THE CHECK:

Recalculate the difference.

VERDICT:

$$(A1 - B1) = (A2 - B2)$$

If equal: Instrument is ADJUSTED.
If unequal: Instrument requires SERVICE.