From image geometry to a tracer balance — review sheet

Use this after attempting the worked examples and practice. Explain each claim in words before calculating.

Key ideas

- Image, mask, mesh and solution are different objects.
- Boundary conditions and wall assumptions affect the calculated flow.
- The classroom washout model is a single compartment, not CFD.
- Numerical checks and independent validation answer different questions.

Common errors and repairs

An attractive mesh proves the geometry is correct. Inspect source-image agreement, physical scale, connectivity and boundary labels.

V/Q is the exact departure time of each particle. It is the time constant of the ideal well-mixed concentration curve.

A washout curve predicts stroke. It is a model output; outcome claims need separate biological and validation evidence.

Retrieve without your notes

- What remains when Q=0?
- What happens to the curve when Q and V both double?
- What would make the small pocket behave differently here?

Readiness check

- Distinguish an intensity image, a segmentation, a mesh and a flow solution.
- Specify the missing boundary and wall assumptions for a synthetic chamber.
- Interpret a well-mixed washout comparison without calling it spatial CFD.
- Separate a numerical check from validation against independent observations.