Fetal pathways and signed junction balances — review sheet

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

Key ideas

- The placenta supplies fetal exchange; pulmonary perfusion is not zero.
- Foramen ovale links atria; ductus arteriosus links pulmonary artery and aorta.
- Flow reversal and pathway closure are different.
- At steady junctions, inflow equals outflow with the chosen signs.
- A topology change requires a newly consistent state.

Common errors and repairs

Fetal blood is blue before it reaches the lungs. Blood is red; oxygen content varies, and the placenta is the main fetal exchange organ.

Zero flow proves permanent closure. Equal pressures or directional restriction can also produce zero flow.

All other flows stay fixed when a shunt is erased. Recheck every junction balance after changing the connection rule.

Retrieve without your notes

- Which connection bypasses part of hepatic circulation?
- What does $Qd < 0$ mean?
- What do the current equations fail to predict?

Readiness check

- Trace placental supply, foramen ovale and ductus arteriosus pathways using named anatomy.
- Distinguish pressure-driven flow reversal from functional or anatomical closure.
- Calculate a signed ductus flow and a one-way foramen surrogate.
- Check four junction balances before and after a prescribed topology change.
- State which birth-transition mechanisms the network calculation leaves out.