

Solutions

2.1

- Lungs are closed: blood must bypass them to reach the body.

2.2

- First breath drops pulmonary resistance → left-atrial pressure rises → functional closure.

2.3

- Weeks 7–8.

3.1

- Placenta → umbilical vein → IVC → right atrium → (i) foramen ovale → left atrium, and (ii) the remainder → right ventricle → pulmonary artery → ductus arteriosus → aorta.
- Pressures: pulmonary resistance is sky-high in utero, so blood takes the low-resistance shunts.
- Postnatal: air inflates lungs, resistance falls, left pressure rises; both shunts reverse gradient and close.

3.2

- Weeks 7–8 (palate shelves + ventricular septum both mid-closure).
- Simultaneous neighbours: one disruption, several systems.
- Examine every midline neighbour – the heart by auscultation and echo.