## Solutions

**2.1**

- $Ca^{2+}$ – its influx with membrane damage is the point of no return ✓.

**2.2**

- Caseous necrosis ✓.

**2.3**

- Metaplasia – one mature lining type swapped for a hardier one ✓.

**3.1**

- At 20 min: pump failure only – swelling resolves on reperfusion ✓.
- At 4 h: membranes leak, $Ca^{2+}$ enters, mitochondria die → necrosis ✓.
- Cytosolic enzymes (LDH/ALT) leak into blood – the cell's biography readable ✓.
- Solid-organ infarct = coagulative: proteolysis is slow, outlines persist ✓.

**3.2**

- Bed rest → atrophy (smaller cells); cardiac hypertension → hypertrophy (bigger cells) ✓.
- Pregnancy uterus → hyperplasia (more cells, plus hypertrophy) ✓.
- Smoking bronchus → metaplasia (squamous replaces columnar) ✓.
- Distinguish by what changes: size, number, or type ✓.