

Solutions

2.1

- IgG ✓.

2.2

- Cytosolic (self-made) samples to CD8 cells ✓.

2.3

- $1/2 \times 1/2 = 1/4$ ✓.

3.1

- In germinal centres B cells proliferate, switch IgM→IgG (CD40L–CD40 – cytokines) and hypermutate V regions; higher-affinity mutants are selected.
- Dominant IgG at 10–100× affinity ✓.
- Day 4: IgM only (or nothing) – primary-response lag ✓.

3.2

- $P(\text{at least one full match of three}) = 1 - (3/4)^3 = 1 - 0.422 = 0.578 \approx 58\%$ ✓.
- HLA-DR drives the direct T-cell alloresponse strongest (DR presents the broadest peptide repertoire to CD4 help).
- ABO mismatch → pre-formed anti-A/B antibody → hyperacute rejection, minutes after reperfusion ✓.