

# 7.2 Antigen recognition: antibodies, receptors and MHC

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_ **Total: 24 marks**

**KEY WORDS** major histocompatibility complex

## Objective

Distinguish the two recognition systems and compute diversity and match probabilities.

## 1 Key knowledge and worked examples

### ■ The chemistries

Ig/BCR binds free antigen (whole shape); TCR sees peptide + MHC only (I: cytosol → CD8; II: eaten → CD4) ✓.

### ■ Worked example: the library

V(D)J + junctional diversity →  $10^6$ – $10^8$  specificities; class switch

- affinity maturation 10–100×; sibling full match 1/4 ✓.

## 2 Practice

**2.1** Which Ig class crosses the placenta? [3]

**2.2** What does MHC-I display and to which T-cell subset? [3]

**2.3** Compute the chance two siblings share both HLA haplotypes. [3]

## 3 Exam-style questions

**3.1** A laboratory reports a new antibody titre  $40\times$  baseline at day 14 (fictional serology).

Explain the class-switch and affinity-maturation events behind the rise (germinal centre). Predict the dominant Ig class and its affinity change. State what the same sample at day 4 would likely have shown. [7]

**3.2** A kidney transplant candidate has three siblings (fictional).

Compute the probability that at least one sibling is a full 2-haplotype match (each sibling 1/4). Explain why HLA-DR matching matters most for outcome. State what ABO mismatch would cause and when. [8]