

7.4 Immunological memory and vaccination

Name: _____ Class: _____ Date: _____

Total: 23 marks

KEY WORDS herd immunity

Objective

Read primary/secondary curves and compute herd-immunity thresholds.

1 Key knowledge and worked examples

■ The curves

Primary: 4–7 d lag, IgM→IgG, peak 7–14 d. Secondary: hours–2 d, IgG, 10–100× ✓. Herd: $1 - 1/R_0$.

■ Worked example: policy from one equation

Measles R_0 12–18 → 92–95 % immune; influenza 1.3 → ~25 % ✓.

2 Practice

2.1 Which Ig class dominates a secondary response? [3]

2.2 Compute the herd threshold for $R_0 = 4$. [3]

2.3 Why does a 3-dose schedule exist for hepatitis B? [3]

3 Exam-style questions

3.1 A serology shows day 5 IgM positive/IgG negative and day 16 IgM positive/IgG fourfold rise (fictional).

Interpret both timepoints (acute primary infection, seroconverting). Explain the class and titre pattern from the primary curve. State what a stable single IgG titre would mean. [7]

3.2 A region's measles vaccine coverage drops from 95 % to 84 % (fictional).

Compute the susceptible fraction above threshold (needed $\leq \sim 5\text{--}8\%$; now 16 %). Explain why outbreaks follow (R_0 12–18). State what coverage the region must restore and why influenza policy differs ($\sim 25\%$ threshold). [7]
