

This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.

The immune system defends against pathogens through non-specific and specific responses.

**Required Practical: Aseptic technique — culturing bacteria, testing antibiotic effectiveness.**

- Non-specific: skin barrier, mucus, cilia, stomach acid, phagocytosis
- Specific: lymphocytes produce antibodies complementary to specific antigens
- Memory cells: remain after infection → rapid response on re-exposure → immunity
- Vaccination: harmless antigen → antibodies + memory cells → protection without disease
- Herd immunity: enough vaccinated → pathogen cannot spread → unvaccinated protected
- ★ **HT Monoclonal antibodies:** from single lymphocyte clone → very specific. Used in pregnancy tests, cancer treatment

**Key Terms**

<b>Antibody</b>	Specific protein binding to one antigen — produced by lymphocytes
<b>Memory cell</b>	Long-lived lymphocyte — enables rapid response on re-exposure
<b>Monoclonal antibody</b>	Antibody from single clone — highly specific — used diagnostically and therapeutically

■ **Exam Tip:** Specific immune response: antigen detected → lymphocytes produce antibodies → antibodies bind antigens → memory cells remain. This sequence must be correct.