This paper covers the **full Higher Separate** specification. Higher Tier questions are marked ★. Separate-only questions are marked ◆.

Pathogens and Communicable Disease (5.1–5.3)

Specification reference: 5.1

Q1. Explain how HIV causes AIDS. Describe the progression from initial infection to AIDS.

[4 marks]

Q2. Explain why antibiotics cannot be used to treat viral diseases such as influenza.

[3 marks]

The Immune System and Vaccination (5.4–5.5)

Specification reference: 5.4

Q3. Describe the specific immune response when a pathogen enters the body for the first time. Explain how vaccination exploits this response.

[5 marks]

★ HIGHER TIER

Q4. ★ Describe how monoclonal antibodies are produced and explain why they are useful in treating cancer.

[4 marks]

Drug Development (5.6–5.9)

Specification reference: 5.6

Q5. Describe the stages of clinical trials for a new drug. Explain why a double-blind placebo-controlled trial is the gold standard.

[4 marks]

Total: 20 marks

Disease and the Immune System

Edexcel · Higher Tier

Pathogens and Communicable Disease (5.1–5.3)

Q1 (4 marks)

Explain how HIV causes AIDS. Describe the progression from initial infection to …

• HIV is a virus that infects CD4+ T helper lymphocytes (white blood cells) [1]

• HIV replicates inside T cells, destroying them [1]

• As T cell count falls, the immune system becomes progressively weaker [1]

• AIDS: T cell count falls below critical level — opportunistic infections (that healthy immune system would control) become life-threatening [1]

Q2 (3 marks)

Explain why antibiotics cannot be used to treat viral diseases such as influenza…

• Antibiotics target bacterial-specific structures such as cell walls [1]

• Viruses do not have cell walls or bacterial ribosomes [1]

• Viruses replicate inside host cells using the cell's own machinery — targeting viral replication would also kill host cells [1]

The Immune System and Vaccination (5.4–5.5)

Q3 (5 marks)

Describe the specific immune response when a pathogen enters the body for the fi…

• Pathogen has antigens on surface [1]

• Lymphocytes produce specific antibodies complementary to the antigens [1]

• Antibodies bind to antigens — pathogen marked for destruction [1]

• Memory cells formed — remain in body long-term [1]

• Vaccine contains harmless antigen → same response → memory cells formed → rapid protection on real exposure [1]

Q4 (4 marks) [★ HT]

★ Describe how monoclonal antibodies are produced and explain why they are usefu…

• B lymphocyte producing desired antibody fused with tumour cell → hybridoma cell [1]

• Hybridoma cells divide rapidly producing large quantities of identical antibodies [1]

• Monoclonal antibodies specific to cancer cell antigens — attached to a toxic drug [1]

• Delivered directly to cancer cells only (magic bullet) — reduces damage to healthy cells compared to conventional chemotherapy [1]

Drug Development (5.6–5.9)

Q5 (4 marks)

Describe the stages of clinical trials for a new drug. Explain why a double-blin…

• Phase 1: healthy volunteers — test safety and dosage [1]

• Phase 2: patients with disease — test effectiveness [1]

• Phase 3: large-scale trial vs placebo or existing drug [1]

• Double-blind: neither doctor nor patient knows allocation — prevents bias from doctors and placebo effect in patients [1]