Higher Tier — Separate Science

Full Higher Separate content. ★ = Higher Tier. ◆ = Separate Science only.

Q1. Describe THREE non-specific defences of the body against pathogens.

[3 marks]

Q2. Explain the specific immune response to a new pathogen entering the body for the first time.

[5 marks]

★ HIGHER TIER

Q3. ★ Describe how monoclonal antibodies are produced and explain TWO of their medical uses.

[4 marks]

Total: 12 marks

Q1 (3 marks)

Describe THREE non-specific defences of the body against pathogens.

- Skin: physical barrier — prevents pathogen entry [1]
- Mucus in airways: traps pathogens [1]
- Stomach acid (pH 2): kills pathogens ingested with food and water [1] — accept: cilia sweeping mucus

Q2 (5 marks)

Explain the specific immune response to a new pathogen entering the body for the first tim…

- Pathogen has specific antigens on its surface [1]
- Phagocytes engulf some pathogens (non-specific response) [1]
- Lymphocytes detect specific antigens and produce complementary antibodies [1]
- Antibodies bind to antigens — mark pathogen for destruction [1]
- Memory cells remain in body — rapid antibody production on re-exposure → no symptoms [1]

Q3 (4 marks) [★ HT]

★ *Describe how monoclonal antibodies are produced and explain TWO of their medical uses.*

- B lymphocyte producing desired antibody fused with tumour cell → hybridoma cell [1]
- Hybridoma cells clone to produce large quantities of identical (monoclonal) antibodies [1]
- Use 1: cancer treatment — antibody targeted to tumour antigen carries drug directly to cancer cells (magic bullet) [1]
- Use 2: pregnancy test — detects hCG hormone / OR: diagnosis of specific diseases [1]