Higher Tier — Separate Science

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

Q1. Explain how vaccination protects an individual from a specific disease.

[4 marks]

Q2. Explain what herd immunity is and why vaccination rates must remain above a threshold to maintain it.

[3 marks]

★ HIGHER TIER

Q3. ★ Explain why some vaccines (e.g. influenza) need to be updated every year.

[2 marks]

Total: 9 marks

E: Vaccination

Q1 (4 marks)

Explain how vaccination protects an individual from a specific disease.

• Vaccine contains harmless/dead/weakened pathogen or its antigens [1]

• Immune system responds — lymphocytes produce specific antibodies [1]

• Memory cells are produced and remain in the body [1]

• If real pathogen enters: memory cells produce antibodies very rapidly — infection destroyed before symptoms develop [1]

Q2 (3 marks)

Explain what herd immunity is and why vaccination rates must remain above a threshold to m…

• Herd immunity: when enough people in a population are immune that the pathogen cannot spread easily [1]

• Unvaccinated individuals are indirectly protected — unlikely to encounter pathogen [1]

• If vaccination rates fall below threshold, chain of immunity breaks and outbreaks become likely [1]

Q3 (2 marks) [★ HT]

★ *Explain why some vaccines (e.g. influenza) need to be updated every year.*

• Influenza virus mutates rapidly — antigens on its surface change each year (antigenic variation) [1]

• Memory cells from previous vaccine no longer recognise the new strain — new vaccine needed each year [1]