



Vaccines

1 Explain what vaccines are and how they work

- Vaccines consist of dead or inactivated pathogens that are injected into a person
- The antigens are detected by the immune system and stimulate an immune response
- The immune system remembers the antigens (memory cells)
- So on future infections the immune system can respond more strongly/rapidly to destroy the pathogens
- So the vaccine grants immunity

[4 marks]

2 Give two examples of diseases that can be vaccinated against

- Measles, mumps, rubella, tuberculosis, smallpox etc

[2 marks]

3 Herd immunity is achieved when a large portion of the population has been vaccinated against a disease. How does this reduce the chance that **unvaccinated** people in the population will catch it?

- As such as high proportion of the population is vaccinated against the disease, there are few hosts for the pathogen
- This means that the pathogen cannot survive in the population, and so there are no/few hosts for the unvaccinated people to catch it from - reducing their risk of catching it

[2 marks]

4 What are epidemics and how can vaccination programs influence them?

- Epidemics are waves of disease that spread rapidly in a population
- Vaccination programs reduce their occurrences/severity because less people can catch the disease, so the spread is more difficult

[2 marks]

5 Give two potential problems of vaccines

- Side effects such as rash at site of injection, headaches or seizures
- They might not grant immunity

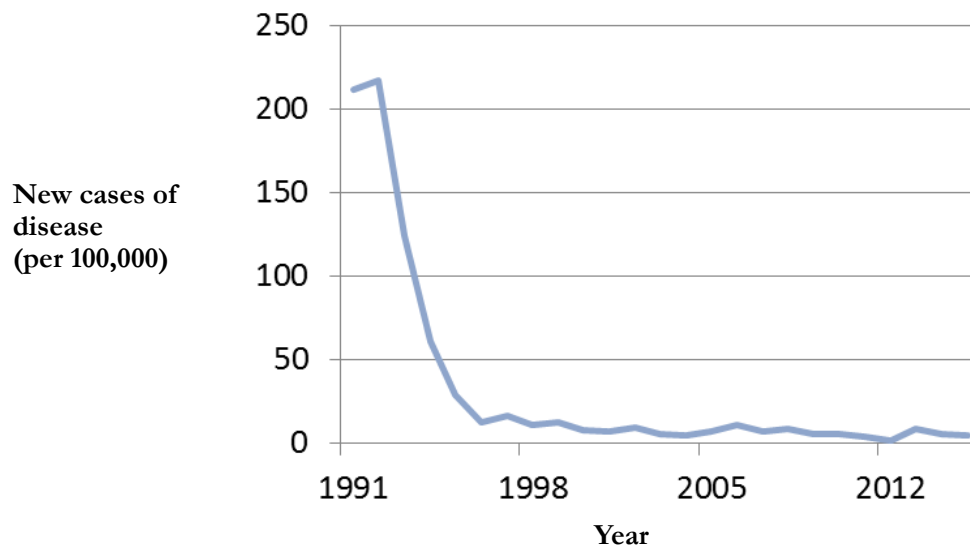
[2 marks]

6 What is the difference between antibodies and antigens?

- Antibodies are proteins created by our body to target antigens and act as signals
- Antigens are things that are detected as foreign by our immune system

[2 marks]

- 7 The following graph shows the new cases of a certain disease. A new vaccine to the disease was introduced in 1991. Describe and explain the trend shown in the graph.



- In 1991 when the vaccine is introduced there are around 220 new cases of disease per 100,00 people.
- This rapidly drops to less than 25 new cases by 1996 though
- It then continues to fall for the next 20 years, although it does fluctuate up and down
- This rapid drop is due to the uptake of the vaccine, as people are immune to the disease less people catch it
- It may also be due to herd immunity

[4 marks]

[Total 18 marks]