

**AQA, OCR, Edexcel**

**A Level**

# **A Level Biology**

## **The Immune System Questions**

Name:

**M M E**

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Total Marks: /22

## The Immune System

1. The immune system is a biological defence that protects the body from potentially harmful substances by recognising invading pathogens and responding to them appropriately.

a)

i) What is the definition of a pathogen and give two examples. (3 marks)

b) In order for a pathogen to become established in an organism, it must first get past the organisms primary defences. The skin is one example of a primary defence.

i) How has the human digestive system evolved to defend itself from pathogens? (2 marks)

ii) How has the human respiratory system adapted to defend itself from pathogen invasion? (2 marks)

2. The immune system can be broken down into a number of stages.

a) The first stage is phagocytosis.

i) What kind of cell is a phagocyte? (1 mark)

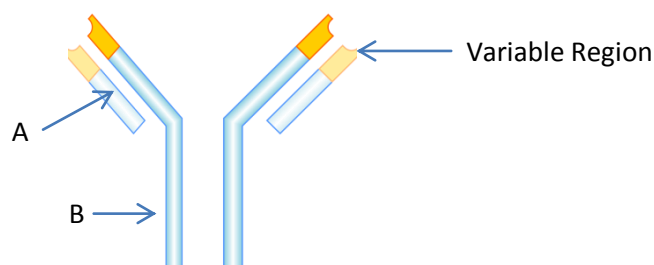
ii) Outline the stages of phagocytosis. (4 marks)

b) Phagocytes then activate T cells. T cells have receptors that are complementary to antigens on the surface of cells.

i) What is an antigen? (1 mark)

ii) When an antigen binds to a receptor on a T cell, the T cell becomes activated and differentiates into different types of T cells. What are these T cells and what are their functions? (6 marks)

c) B cells are involved in the final stage of the immune response. Once activated they differentiate into plasma cells and memory cells. The plasma cell surface is covered with antibodies. The diagram below shows the structure of an antibody.



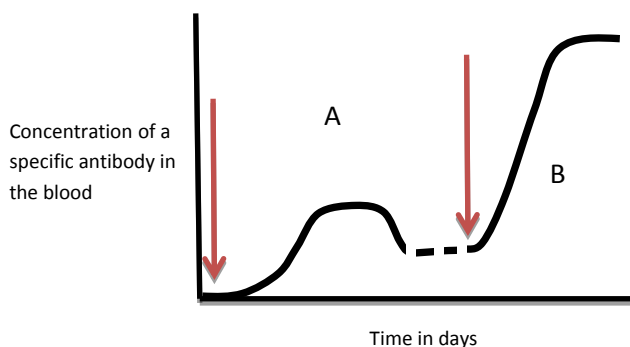
i) Label A and B on the diagram above (2 marks)

ii) How many polypeptide chains make up an antibody? (1 mark)

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- iii) Why is the shape of the variable region important? (1 mark)
  - iv) By what process do B-cells divide? (1 mark)
  - v) What bonds hold the polypeptide chains together? (1 mark)
  - vi) What is meant by the term 'agglutination' in reference to antibody action? (3 marks)
  - d) What is meant by the terms cellular response and humoral response? (2 marks)
3. The body's immune response changes over time as a result of exposure to different pathogens.

a) The graph below shows how the concentration of an antibody changes in the blood over a period of time. The red arrow indicates exposure to the same antigen.



- i) Explain what is happening in part A of the graph. (3 marks)
- ii) Why is the curve of the graph steeper in part B? (3 marks)