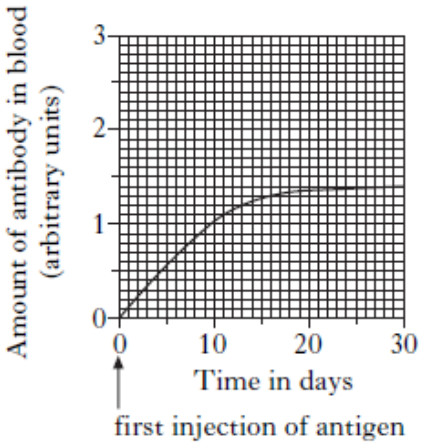
Unit 4 – CfE Human Higher Biology

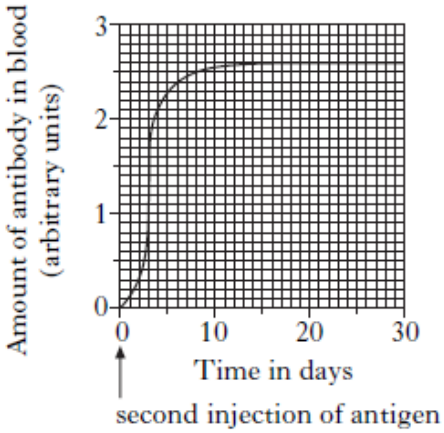
Homework

Vaccines

1.

The graphs below show the effect of two injections of an antigen on the formation of an antibody.





How many days after the second injection does the amount of antibody in the blood reach the maximum achieved after the first injection?

A 3 days

B 6 days

C 20 days

D 30 days

2.

Which of the following describes an adjuvant correctly?

A An inactivated pathogen

B A weakened pathogen

C A molecule that inhibits the immune response

D A molecule that enhances the immune response

3

Adjuvants are often added to vaccines to

A make the vaccine safer

B enhance the immune response

C make immunity last for a longer time

D ensure the vaccine contains no live pathogens.

4

Which of the following describes an adjuvant correctly?

A An inactivated pathogen

B A weakened pathogen

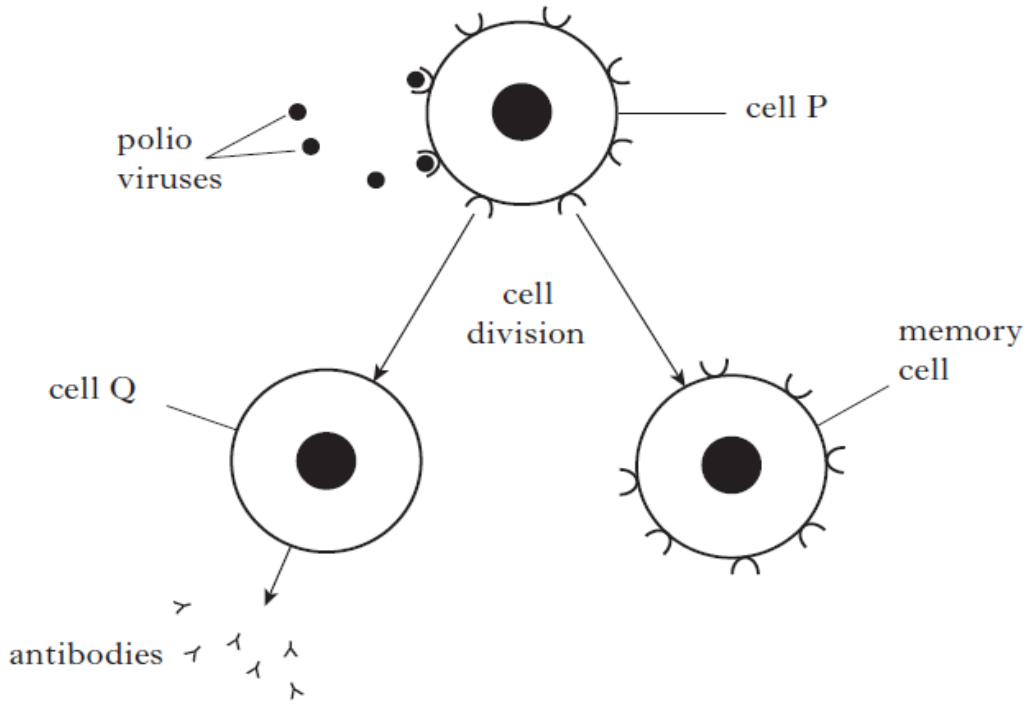
C A molecule that inhibits the immune response

D A molecule that enhances the immune response

Section B

1.

The diagram below shows how the immune system responds to a polio virus in a vaccine.



(*a*) What type of immunological response involves the production of antibodies?

_____ **1**

(*b*) (i) Name cell Q.

_____ **1**

(ii) Describe **two** functions of cell P that are shown in the diagram.

1 _____

2 _____ **1**

(*c*) Describe the role of memory cells in the immune system.

_____

_____ **1**

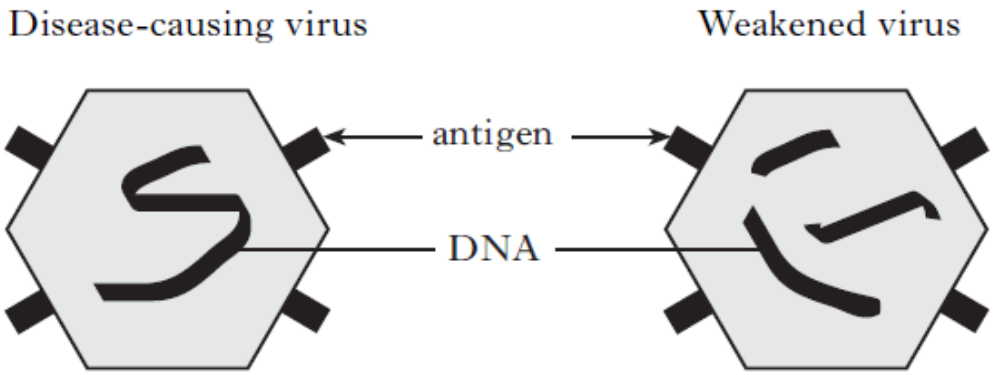
(*d*) Explain why vaccination against polio would not provide immunity against the measles virus.

_____

_____ **1**

2.

The diagrams below show a disease-causing virus and one of the same type which has been weakened to make it less harmful.



(*a*) A woman is vaccinated with the weakened form of the virus.

(i) Explain why she does not develop the disease from the vaccination.

_____

_____ **1**

(ii) What feature of the weakened virus results in her gaining immunity from the disease?

_____

_____ **1**

(iii) Explain why this form of immunity is described as being both artificial and active.

Artificial _____

_____ **1**

Active _____

_____ **1**

(*b*) After a flu epidemic, two individuals, X and Y, were found to possess antibodies against this strain of influenza. X had recently recovered from flu while Y had been given a vaccine against it.

Complete the following sentences by underlining one option from each pair shown in **bold**.

The immunity gained by X is **active/passive** and **naturally/artificially** acquired.

The immunity gained by Y is **active/passive** and **naturally/artificially** acquired. **2**

(c) A different vaccine is required against each strain of the influenza virus.

Suggest why different vaccines are required.

_____

_____ **1**

(d) Researchers are attempting to develop a new vaccine which will be effective against **all** strains of the influenza virus. Trials of this new vaccine have shown that it increases the activity of T-lymphocytes in the body.

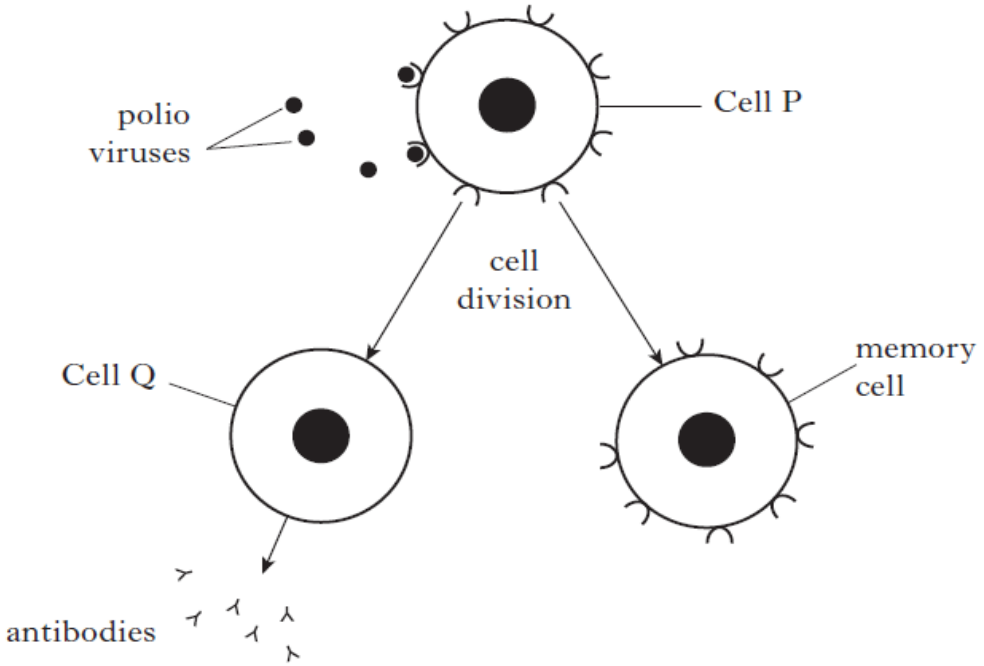
Describe the method by which T-lymphocytes combat infection.

_____

_____ **1**

3.

The diagram below shows how the immune system responds to a polio virus in a vaccine.



(*a*) Name the type of immunity which results from vaccination with infectious pathogens such as the polio virus

_____ **1**

(*b*) (i) Name cell Q.

_____ **1**

(ii) Describe **two** functions of cell P that are shown in the diagram.

1 _____

2 _____ **1**

(*c*) Describe the role of memory cells in the immune system.

_____

_____ **1**

(*d*) Explain why vaccination against polio would not provide immunity against the measles virus.

_____

_____ **1**

(*e*) When producing a vaccine an adjuvant is usually mixed with the pathogen.

Explain why an adjuvant is added.

_____

_____ **1**

(*f*) Clinical trials of vaccines often use a double-blind protocol.

Describe what is meant by the term double-blind.

_____

_____ **1**

4.

(*a*) Concerns about the MMR vaccine caused the percentage of children in the UK immunised against measles, mumps and rubella to fall below the critical level of 80% between 2000 and 2005. As a result, outbreaks of these viral diseases occurred in various parts of the country.

(i) State what is present in an injection of vaccine. 1

(ii) Explain how the process of vaccination prevents a child from showing symptoms of mumps during future outbreaks of the disease.

_____
_____
_____
_____

(iii) Suggest why these diseases spread more rapidly when the vaccination level falls below 80%.

_____
_____
_____
_____

1

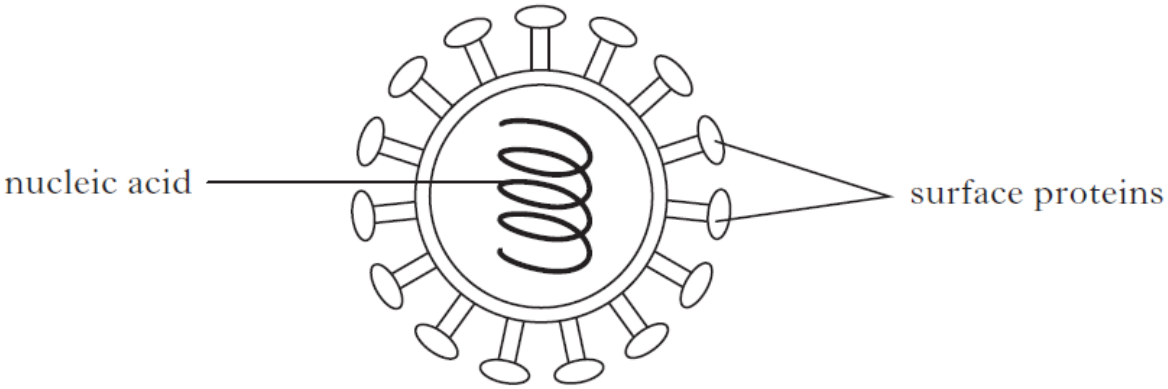
(b) Unlike the MMR vaccine, a vaccine against influenza should be given annually.

State the reason for this.

_____
_____
_____
_____ 1

5.

The diagram below shows the structure of one strain of the influenza virus.



(*a*) This virus can be used to prepare a flu vaccine. In order to do this the nucleic acid must be broken up but the surface proteins left intact.

Explain why it is necessary to:

(i) break up the nucleic acid _____

_____

(ii) leave the surface proteins intact _____

_____ **2**

(*b*) A different vaccine is required against each strain of the influenza virus.

Suggest why different vaccines are required.

_____

_____ **1**

(*c*) Researchers are attempting to develop a new vaccine which will be effective against **all** strains of the influenza virus. Trials of this new vaccine have shown that it increases the activity of T-lymphocytes in the body.

Describe **two** ways in which T-lymphocytes combat infection.

1 _____

_____

2 _____

_____ **2**

(*d*) Clinical trials of vaccines use randomised, placebo-controlled protocols.

Describe how these protocols are set up by the researchers.

_____

_____

_____

_____ **2**

Essay

Describe the use of protocols carried out by the manufacturers of vaccines to test the effectiveness of their product (4)

Describe and explain the response by the immune system to a first vaccination against a specific pathogen and compare this to the response by the immune system to a second 'booster' vaccination. (6)