1 Malaria is a disease caused by a eukaryotic parasite.

(a) State **two** features of the malarial parasite that indicate that it is **not** a prokaryote.

1 .....

2 ..... **[2]**

(b) In a piece of word-processed homework, a student stated that one species of parasite that causes malaria is called:

Plasmodium Vivax

State **one** error made by the student.

.....

..... **[1]**

(c) The malarial parasite is carried by an insect, the female *Anopheles* mosquito.

(i) Describe how the mosquito transmits the malarial parasite to a human.

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..... **[3]**

(ii) In order to fight the spread of malaria, insecticides have been used in areas where the *Anopheles* mosquito breeds.

One problem that can occur when using insecticides in this way is the development of insecticide resistance.

Suggest **one other** reason why some people might be concerned about using insecticides.

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..... **[1]**

(iii) Suggest how the effects of insecticide use on a population of *Anopheles* mosquitoes could be measured **and** state the steps that should be taken in order to produce valid and reliable results.

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..... **[5]**

[Total: 12]

2 **(a)** Lymphocytes are important components of the immune system and can be classified into B lymphocytes and T lymphocytes.

For each of the statements in the table below, identify whether the description applies to:

- only B lymphocytes
- only T lymphocytes
- both B and T lymphocytes
- neither.

You may use each response once, more than once, or not at all. The first one has been done for you.

statement	can be applied to ...
form part of immune response	*both*
matured in thymus	
secrete substances which kill infected cells	
manufacture antibodies	
undergo clonal expansion	
activate other lymphocytes	

[5]

(b) Fig. 7.1 shows the concentration of antibodies in a patient's blood following an initial infection with a pathogen. This is known as the primary response.

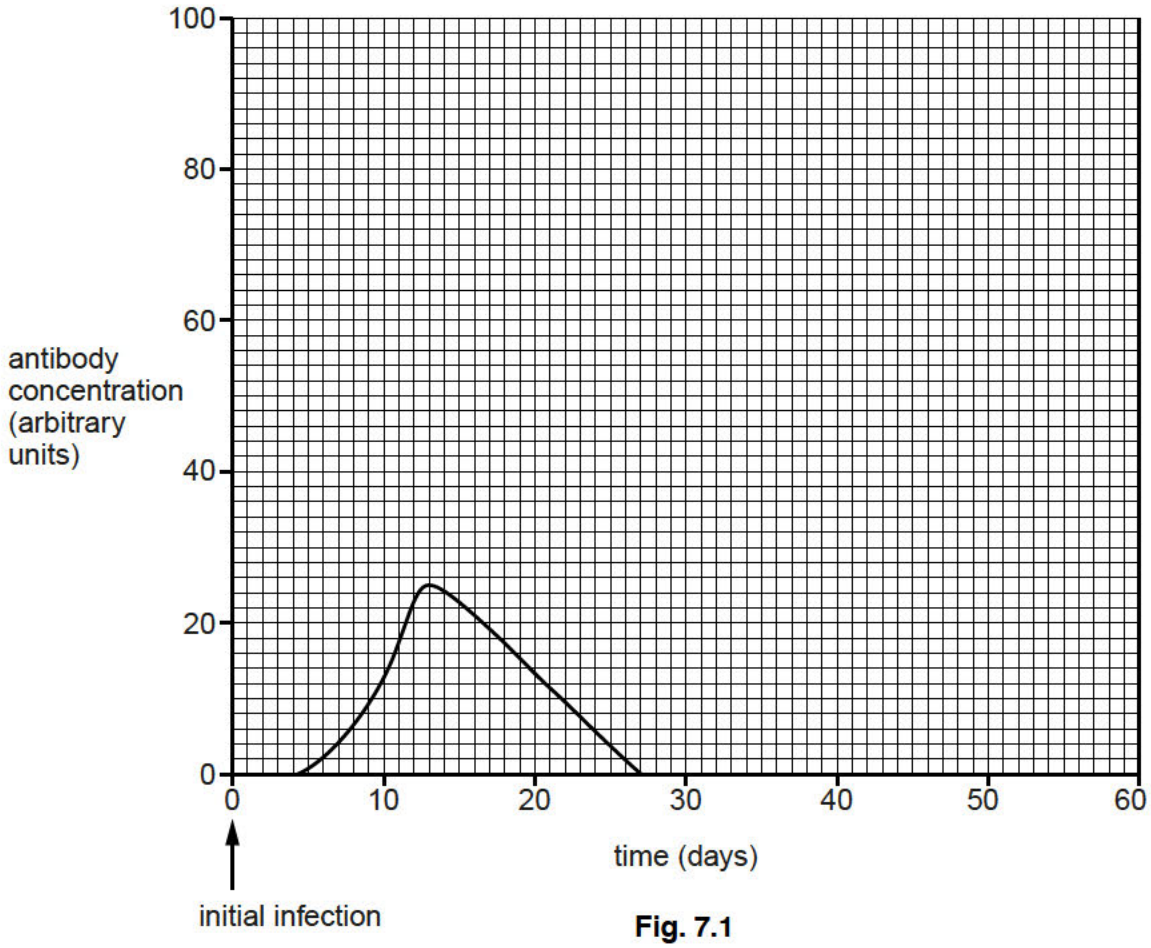


Fig. 7.1

(i) Describe the changes in antibody concentration that occur in the patient's blood during the primary response.

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..... **[3]**

(ii) The patient was subsequently infected with the same pathogen 30 days after the initial infection.

Draw a line **on the graph** to show the likely concentration of antibodies in the patient's blood from 30 days onwards.

..... *The answer to this question must be drawn on Fig. 7.1* ..... **[2]**

(c) Fig. 7.2 shows the structure of an antibody.

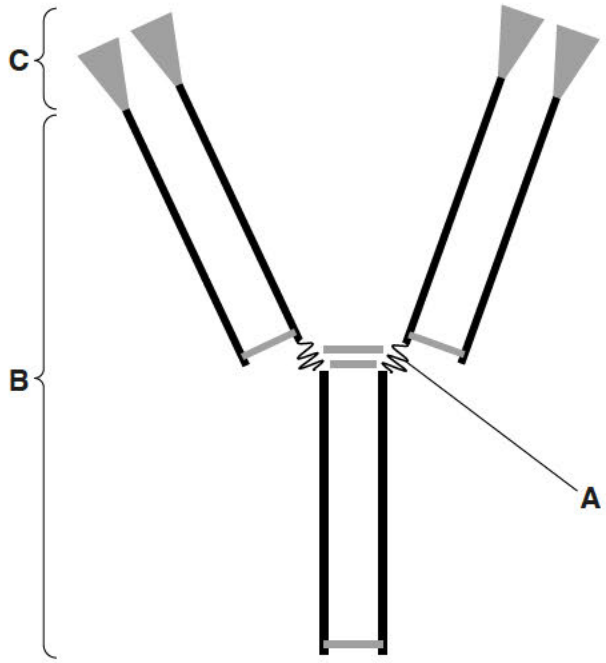


Fig. 7.2

Complete the table below by stating the name and function of each of the regions **A**, **B** and **C**.

region	name	function
A		
B		
C		

[6]

[Total: 16]

3 **(a)** Each winter, the UK government recommends that vulnerable members of the public are vaccinated against the influenza (flu) virus.

(i) State **two** groups of people that the government would consider as being vulnerable.

1 .....

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2 .....

..... **[2]**

(ii) Suggest why the influenza vaccine has to be changed each year.

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..... **[2]**

Fig. 4.1 shows the concentration of antibodies in a patient's bloodstream following an influenza vaccination and then infection with the influenza virus.

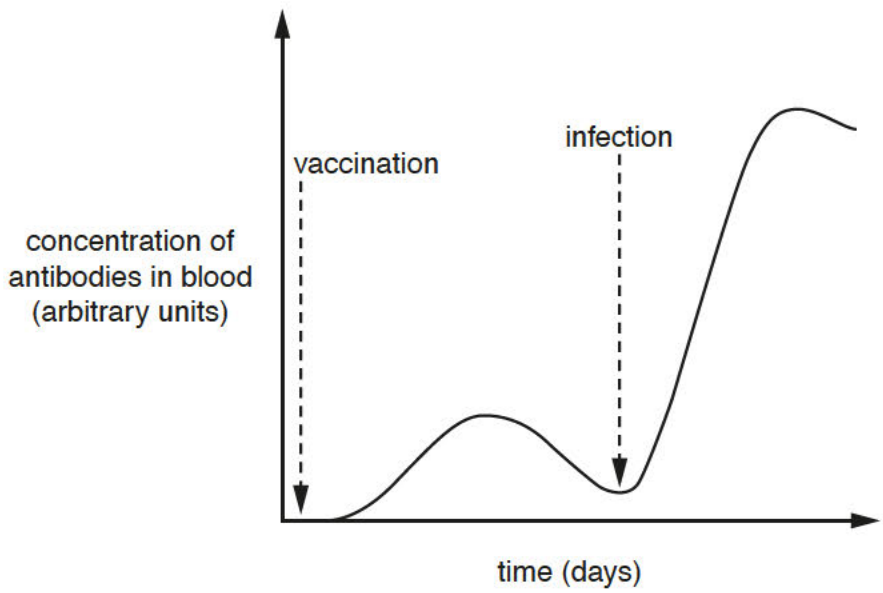


Fig. 4.1

(iii) Using the information from Fig. 4.1, state **two differences** between the primary and secondary immune responses.

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..... **[2]**

(iv) Memory cells are produced when a patient is vaccinated against influenza.

Describe the role of these memory cells when the influenza virus enters the body.

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..... **[3]**

(b) Tamiflu® is an antiviral drug that can be used to treat influenza patients.

(i) State why a doctor would **not** prescribe antibiotics to treat influenza.

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..... **[1]**

(ii) Neuraminidase is an enzyme which is present on the protein coat of the influenza virus.

This enzyme is used to break down the host cell membrane and allow the influenza viruses to leave the infected cell. Tamiflu® is a neuraminidase inhibitor.

Suggest how Tamiflu® could inhibit neuraminidase.

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..... **[2]**

(iii) Suggest how Tamiflu® could help to reduce the spread of influenza.

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..... **[2]**

(c) In an effort to find new drugs to combat a possible new influenza pandemic, researchers have investigated plants used in traditional medicine in Nepal. Two plants, an onion, *Allium oreoprasum*, and an asparagus, *Asparagus filicinus*, have been found to show antiviral properties.

Suggest why researchers in Nepal concentrated their research on plants that had been used in traditional medicine.

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..... **[2]**

[Total: 16]

4 The condition known as AIDS is widespread in some parts of the world.

(a) (i) Identify the infective agent that causes AIDS.

..... **[1]**

(ii) The government has introduced needle exchange programmes for drug users.

Explain how this may help reduce the transmission of AIDS.

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..... **[2]**

(b) Fig. 1.1 shows a simplified diagram of the structure of the infective agent that causes the condition known as AIDS.

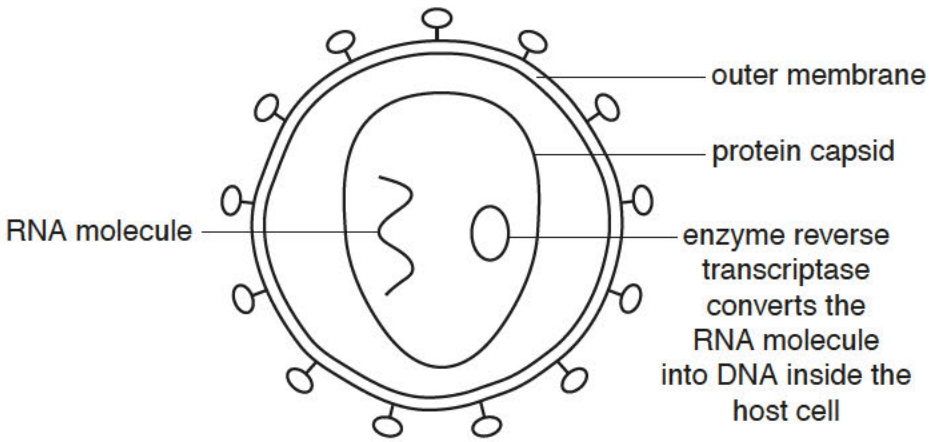


Fig. 1.1

(i) The proteins in the capsid and the RNA molecules are polymers. Polymers are made up of smaller monomer subunits.

Name the monomers that make up:

proteins .....

RNA ..... **[2]**

(ii) The infective agent that causes AIDS takes control of the T lymphocytes of the host.

Using the information in Fig. 1.1, suggest why the infective agent is able to 'take control' once it has entered the T lymphocytes.

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..... **[2]**

(c) People with AIDS frequently become ill following infection with opportunistic diseases such as tuberculosis (TB).

(i) State **three** factors that increase the chance of infection with TB.

1 .....

2 .....

3 ..... **[3]**

(ii) When an infection occurs, some T lymphocytes produce cell signalling molecules called cytokines. These cytokines stimulate specific groups of B lymphocytes to divide.

Describe how cytokine molecules can stimulate specific groups of B lymphocytes to divide.

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..... **[3]**

[Total: 13]