IMMUNITY

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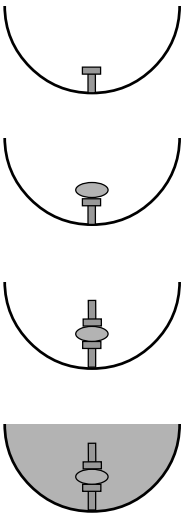
QUESTIONSHEET 1

The diagram shows a system for detecting the presence of a disease organism in the blood of an infected person.



Stage 1	Antibody specific to the disease organism is bound to the surface of the well.
Stage 2	Blood of the infected person added to well. Disease organism binds to specific antibody.
Stage 3	Enzyme combined with antibody specific to disease organism added to the well. Antibody binds to disease organism.
Stage 4	Enzyme substrate added to well. Colour change occurs as a result of the reaction.

(a) Describe one method by which antibodies specific to a disease might have been produced.

.....

.....

.....

[2]

(b) (i) Explain why the disease organism binds to the specific antibody in Stage 2.

.....

.....

[2]

(ii) Explain the role of the enzyme combined with antibody added in stage 3 of this test system.

.....

.....

[2]

(c) A modification of this system can be used to detect the presence of antibodies in the blood of a person infected with syphylis. Suggest how this system could be modified to detect the presence of antibodies.

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[3]

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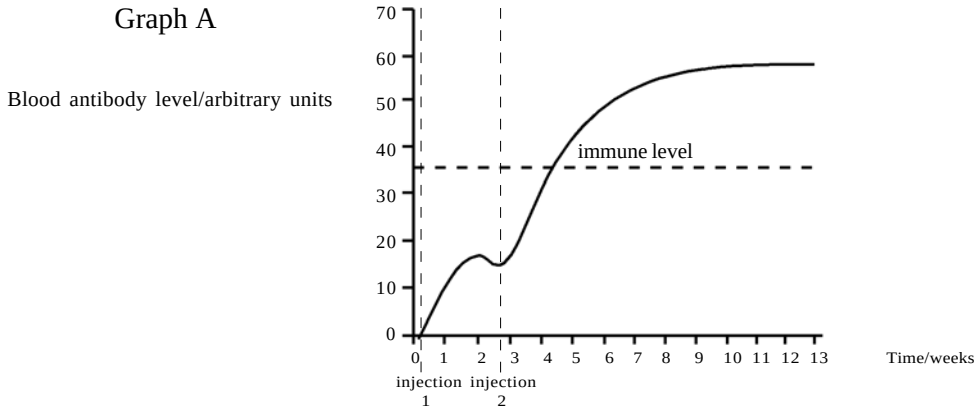
QUESTIONSHEET 2

Graph A shows the response of person to immunisation using a vaccine containing killed pathogens.

Graph A



(a) (i) Explain the response to the first injection.

.....

.....

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.....

.....

[4]

(ii) Explain why the response to the second injection was greater than the response to the second injection.

.....

.....

[1]

(b) Vaccination against diseases such as polio and tetanus lasts for several years. Vaccination against influenza has to be given every year. Explain why.

.....

.....

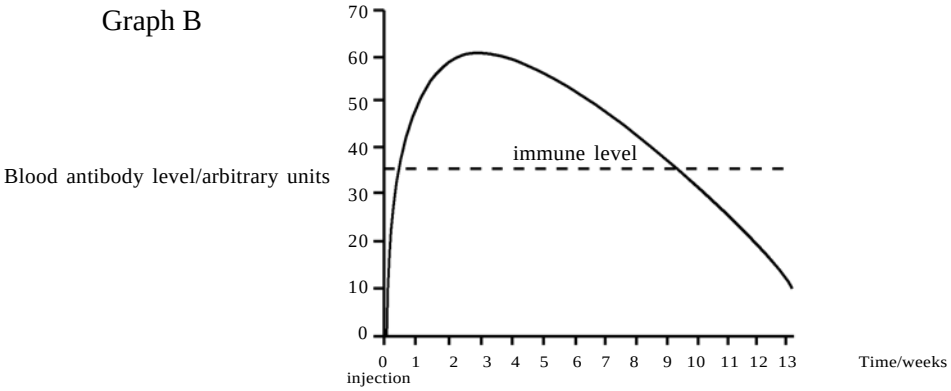
.....

[2]

(Continued....)

People who have not been vaccinated against tetanus may be exposed to the bacteria causing tetanus if they cut their skin on barbed wire. Graph B shows the response of unvaccinated person to immunization against tetanus following such a cut.

Graph B



(c) (i) What is present in the injection given to an unvaccinated person after they have been exposed to the bacteria causing tetanus?

.....

[1]

(ii) Explain why the curve shown in graph B differs from that shown in graph A.

.....

.....

[2]

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QUESTIONSHEET 3

The table below lists some features of cells which are involved with immunity in adult humans. Fill in the appropriate boxes in the table by selecting cells which match the features, from the list below the table. Some boxes may contain more than one relevant cell.

Feature	Cell or cells
Phagocytose bacteria in tissues	
Secrete antiviral antibodies	
Release histamine and serotonin in allergies	
Manufactured in red bone marrow	
Initially stored in the thymus gland	
Main cell of humoral immunity	
Combats effects of histamine in allergic responses	
Acts as a phagocyte after transformation into a tissue macrophage	
Phagocytoses the debris of antibody-antigen reactions	
Differentiates into plasma cells	
Differentiates into cytotoxic killer cells	
Enables rapid immune response to a second infection	
Manufactured in lymphatic tissue	

neutrophils, eosinophils, basophils, monocytes, B-lymphocytes, T-lymphocytes, memory cells, tissue macrophages, mast cells, plasma cells.

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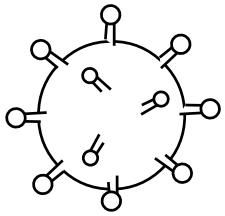
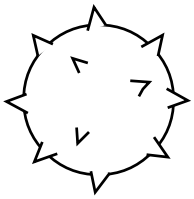
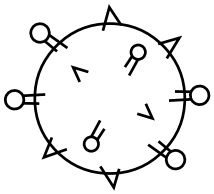
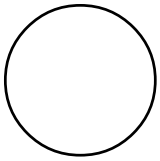
QUESTIONSHEET 4

The diagram below illustrates the ABO blood group system of agglutinogens on the red cells and agglutinins.

Group A	Group B	Group AB	Group O
Agglutinogen A 	Agglutinogen B 	Agglutinogen A + B 	Neither agglutinogen 
Agglutinin b 	Agglutinin a 	Neither agglutinin	Agglutinins a + b 

(a) (i) In the ABO blood group system, what is an agglutinogen?

.....

..... [2]

(ii) In the ABO blood group system, what is an agglutinin?

.....

..... [2]

(iii) When could agglutination occur and what are its effects?

occurrence: .....

.....

effects: .....

.....

.....

..... [4]

(b) (i) List the blood transfusions which would be incompatible.

.....

..... [4]

(ii) Group O blood contains agglutinins a and b but it is permissible to transfuse it into group A, B or AB. Explain why is this is possible.

.....

..... [2]

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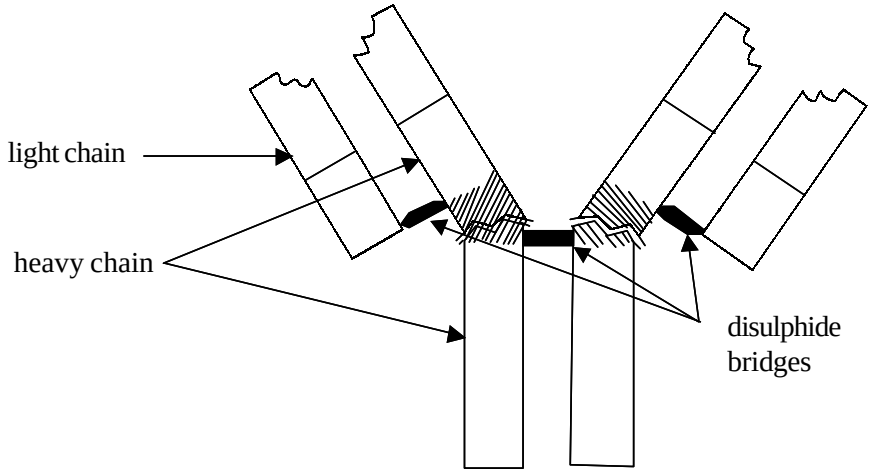
QUESTIONSHEET 5

Do not write in margin

The diagram below shows the general structure of an antibody molecule.



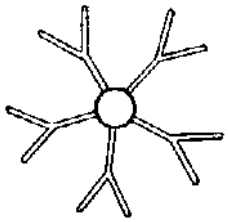
(a) (i) On the diagram above label: the hinged parts of the molecule,
the variable portions of the molecule,
the antigen binding sites. [3]

(ii) The hinged sections of the molecule give it some structural flexibility. Suggest an advantage of this.

.....

..... [2]

(iii) Some antibody molecules are linked together by covalent bonds into groups of five, as shown in the diagram below.



Suggest an advantage of this multiple structure.

.....

..... [1]

(b) (i) Name the main antibody secreting cells of the body.

..... [1]

(ii) One of these cells can secrete antibodies at the phenomenal rate of 2000 molecules per second over a period of up to 5 days. Calculate how many antibody molecules the cell would secrete per day. Show your working.

Answer: ..... [2]

TOTAL / 9

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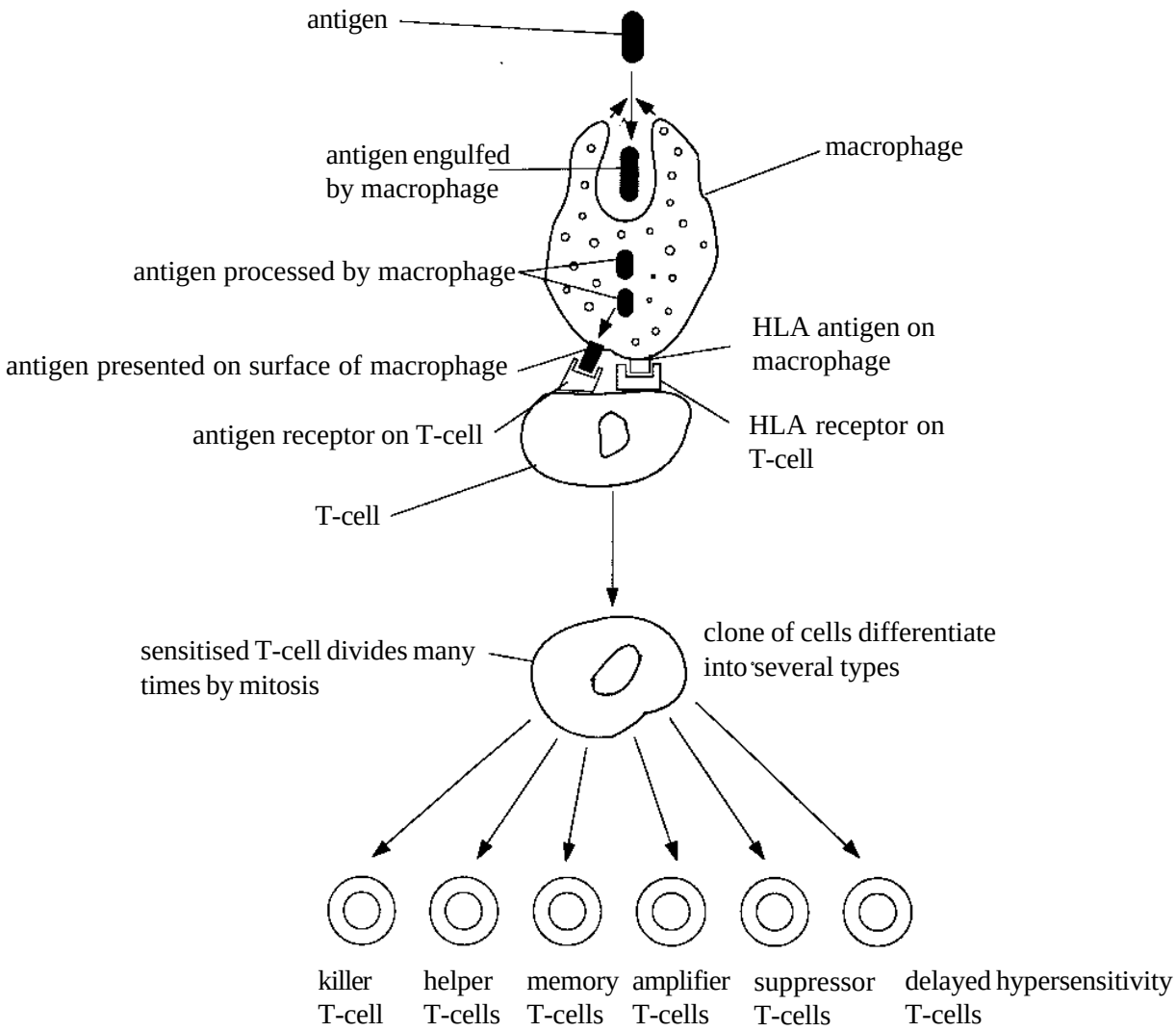
QUESTIONSHEET 6

The diagram below shows the T-cell immune response when the body is infected by a foreign antigen, such as a pathogenic bacterium.



(a) (i) Describe the role of the macrophage in the T-cell response.

.....

.....

.....

.....

..... [4]

(ii) The sensitised T-cells divide thousands of times by mitosis to produce a cloned population of active T-cells. Suggest how this helps the immune response.

.....

.....

..... [2]

(*Continued...*)

Do not write in margin

(b) (i) Describe the activity of the killer T-cells in the immune response.

.....

.....

.....

..... [3]

(ii) What is the function of the memory T-cells in the immune response?

.....

..... [1]

(iii) What is the function of the helper T-cells in the immune response?

.....

..... [1]

TOTAL / 11

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QUESTIONSHEET 7

The following table relates to some features of T and B cells, If a feature is correct put tick (✓) in the box and if it is incorrect put a cross (✗) in the box.

Feature	T-cells	B-cells
May produce antibodies		
Are classed as small lymphocytes		
Develop in the thymus		
May secrete interferon		
Give passive immunity to the organism which possesses them		
Give active immunity to the organisms which possesses them		

TOTAL / 6

IMMUNITY

QUESTIONSHEET 8

Suggest explanations for each of the following:

(a) Immunisation against the diphtheria bacillus will last for a lifetime but annual immunisations are required to give protection against the influenza virus.

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.....

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..... [3]

(b) The worldwide vaccination programme against smallpox succeeded in eradicating the disease completely, but similar programmes against measles, tuberculosis, cholera and malaria have failed to wipe out these diseases.

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..... [3]

(c) For immunological reasons it is advisable to feed new born babies on breast milk for at least a few weeks after birth.

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..... [3]

(d) The development of an autoimmune disease, such as juvenile diabetes mellitus is often linked to a recent Streptococcal infection;

.....

.....

.....

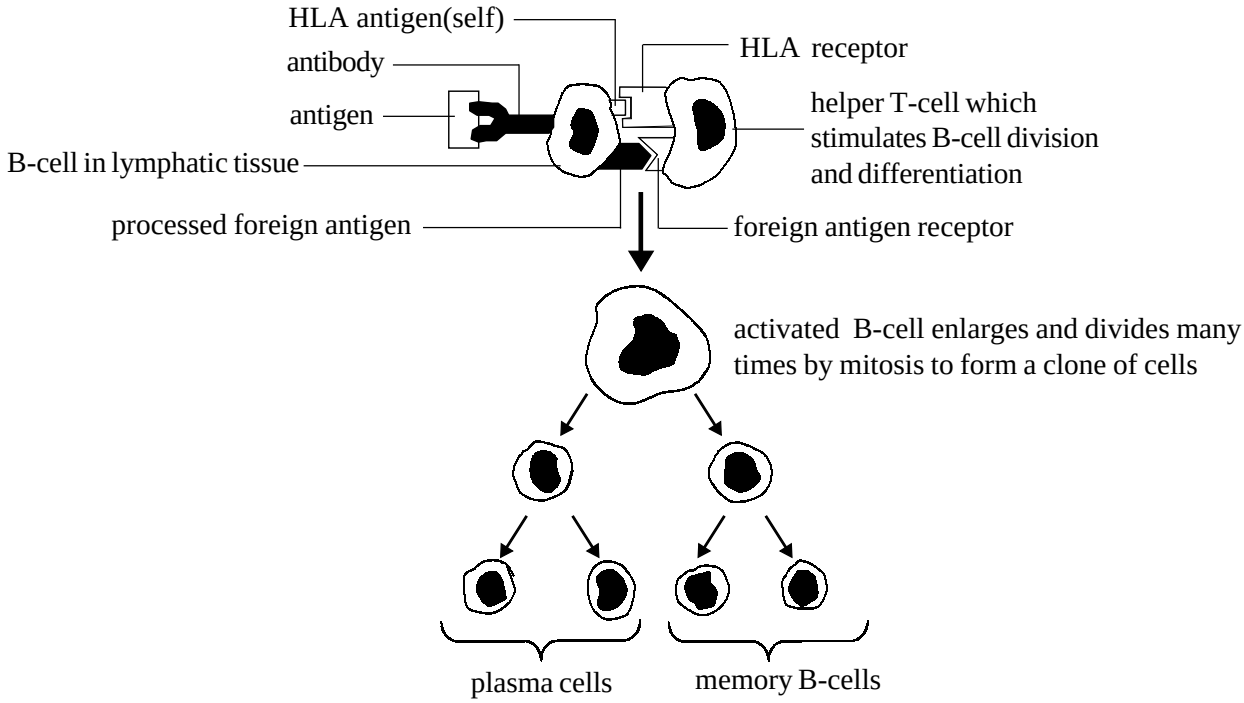
..... [3]

TOTAL / 12

IMMUNITY

QUESTIONSHEET 9

The diagram below illustrates the immune response by the B lymphocytes.



(a) (i) Describe the roles of the B-cells and T-helper cells in establishing the immune response against the antigen.

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..... [4]

(ii) Suggest why the activated B-cell divides many times by mitosis to form a cloned population of cells.

.....

..... [2]

(iii) Describe the role of the plasma cells.

.....

..... [2]

(iv) Describe the role of the memory B-cells.

.....

..... [1]

(b) Distinguish between the primary immune response and the secondary immune response.

.....

.....

.....

..... [3]

TOTAL / 12

IMMUNITY

QUESTIONSHEET 10

Suggest explanations for the following:

(a) Babies are routinely immunised against virus diseases such as measles and polio, but are not immunised against chicken pox.

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.....

.....

..... [3]

(b) Although people have been immunised against tetanus, they will still be given the antibody when exposed to possible tetanus infection due to injury.

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..... [3]

(c) In cases of allergy, such as hayfever, sufferers alleviate symptoms by taking antihistamines.

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.....

..... [3]

(d) Immunity against cowpox will give immunity against smallpox but immunity to chickenpox will not give immunity to smallpox.

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..... [3]

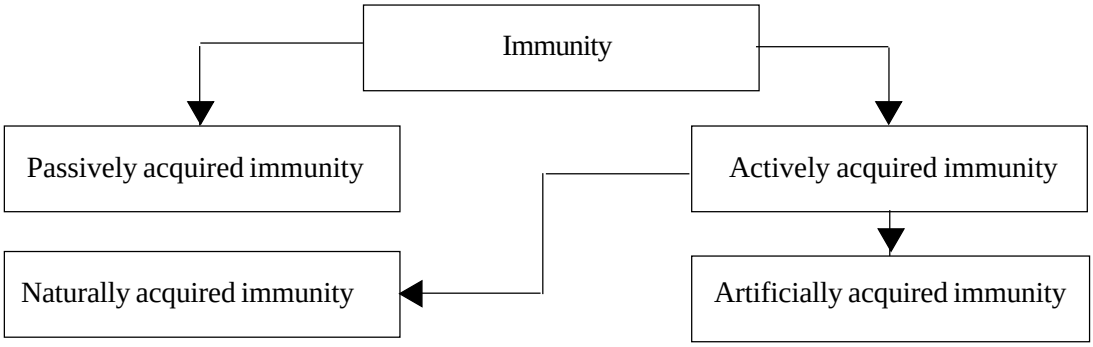
TOTAL / 12

IMMUNITY

QUESTIONSHEET 11

Do not write in margin

The diagram below classifies the various types of immunity.



(a) With reference to <u>two</u> specific examples describe passive acquired immunity.

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..... [4]

(b) (i) Briefly distinguish between natural acquired immunity and artificially acquired immunity.

.....

..... [2]

(ii) List <u>two</u> examples of artificial acquired immunity against virus diseases in babies, and <u>two</u> examples of artificial acquired immunity against bacterial diseases in babies.

viruses: 1. .....

2. .....

bacteria: 1. .....

2. ..... [4]

(b) Some of the following diseases can be protected against by vaccination. Complete the table below by listing the names of the diseases in the relevant box.

whooping cough, lung cancer, diabetes mellitus, German measles, measles, diphtheria, schizophrenia, asthma, cystic fibrosis, tuberculosis, tetanus, HIV, AIDS, polio.

protection by vaccination	no protection by vaccination

[7]

TOTAL / 17

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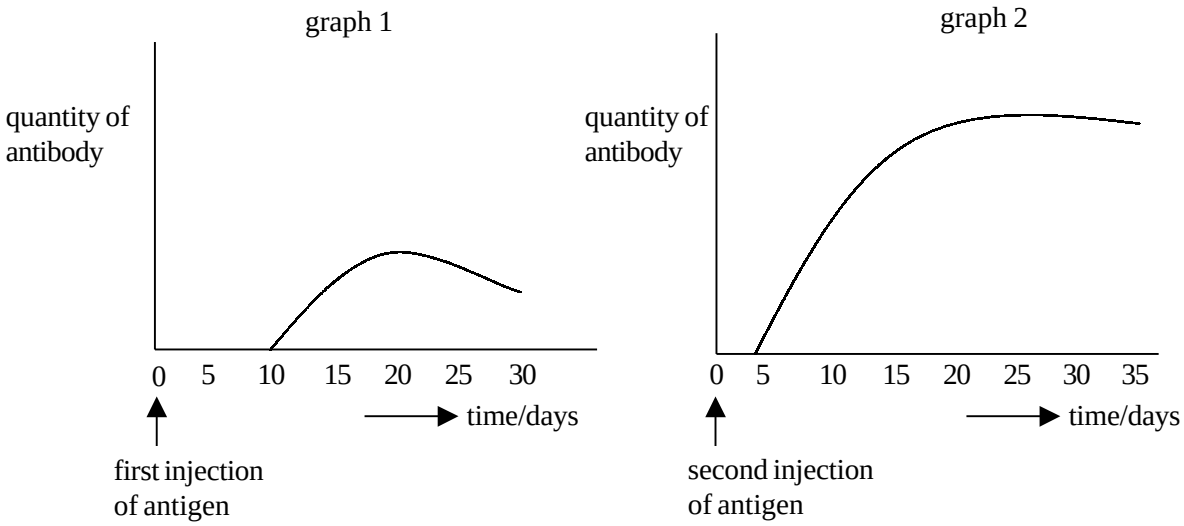
QUESTIONSHEET 12

The graphs below show the quantities of antibodies present in the plasma after a first injection of an antigen (graph 1) and after a second injection of the same antigen three months later (graph 2). The graphs are drawn to the same scale.



(a) (i) Compare the responses obtained after the first injection of antigen and the second injection of antigen.

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..... [3]

(ii) Explain the reasons for the differences in the two responses.

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..... [4]

(b) Explain why successful tissue transplantation is so difficult to achieve, even though the actual surgical techniques are relatively straightforward.

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..... [3]

TOTAL / 10