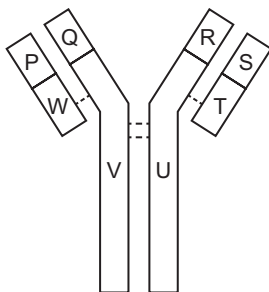


39 The hybridoma method is used for the production of monoclonal antibodies.

Which two types of cell are used in this method?

- A stem cell and B-lymphocyte
- B stem cell and T-lymphocyte
- C tumour cell and B-lymphocyte
- D tumour cell and T-lymphocyte

40 The diagram shows an antibody molecule with some parts labelled.



Which row is correct about the parts that form an antigen-binding site and have identical amino acid sequences?

	form an antigen-binding site	have identical amino acid sequences
A	P and Q	R and S
B	Q and V	P and S
C	R and S	U and V
D	U and V	Q and R

39 Four different treatments were tested in a human volunteer during a year. One of these treatments was a vaccine.

The treatments were injected into the volunteer and blood samples were taken after two weeks. The samples were analysed to obtain a cell count for four types of cell.

The results are shown in the table.

Which treatment was the vaccine?

(Assume the volunteer's baseline blood cell count was the same before each treatment.)

	cell count / cells per cm ³			
	monocytes	neutrophils	plasma cells	macrophages
A	250	180	450	230
B	500	190	220	240
C	260	450	240	250
D	250	190	230	550

40 A bacterial pathogen produces a protein that acts as a toxin. This toxin is harmful to humans.

People can be vaccinated to protect them from the effects of this pathogen.

Which statement describes the sequences of events that occur in a vaccinated person to protect them from the effects of this pathogen?

- A Memory cells divide by mitosis and then differentiate into macrophages that engulf and digest the toxin.
- B Memory cells divide by mitosis and then differentiate into plasma cells that produce antibodies to bind to the toxin.
- C Macrophages divide by mitosis and then differentiate into memory cells that engulf and digest the toxin.
- D Plasma cells divide by mitosis and then differentiate into memory cells that produce antibodies to bind to the toxin.

38 A vaccine is used to create artificial active immunity. After a person has been given a vaccine, it takes a period of time before they develop long-term immunity to the disease.

Which statement about this period of time explains the delay in developing long-term immunity?

- A No memory cells have been produced from B-lymphocytes.
- B No plasma cells have been produced from B-lymphocytes.
- C The primary immune response has **not** produced enough antibodies.
- D The secondary immune response has **not** produced enough antibodies.

- 39** An antiserum to a snake toxin can be obtained by injecting the toxin into a horse. The antiserum is made from blood plasma taken from the horse a few weeks later. The antiserum is injected into a person who has been bitten by the same species of snake.

Which type of immunity occurs as a result of using this antiserum?

- A** artificial active
 - B** artificial passive
 - C** natural active
 - D** natural passive
- 40** Which statement describes the feature of monoclonal antibodies that allows them to accurately treat a specific disease?
- A** They bind to human hormones to produce a colour change.
 - B** A fluorescent dye can be attached to them.
 - C** They have active sites that are complementary to antigens.
 - D** They can carry toxic chemicals.