

1. Question | 9700 Feb-March 2016 P1 V2 Q38

38 Which row correctly identifies the roles of B-lymphocytes and T-lymphocytes?

	secrete antibodies	secrete cytokines	provide humoral response
A	B-lymphocytes	T-lymphocytes	B-lymphocytes
B	B-lymphocytes	T-lymphocytes	T-lymphocytes
C	T-lymphocytes	B-lymphocytes	B-lymphocytes
D	T-lymphocytes	B-lymphocytes	T-lymphocytes

2. Question | 9700 Feb-March 2016 P1 V2 Q39

39 A person's blood group is determined by antigens present on the red blood cells. The table shows the antigens and antibodies in the blood of people with different blood groups.

blood group	antigens on red blood cells	antibodies in plasma
A	A	anti-B
B	B	anti-A
AB	A and B	neither
O	neither	anti-A and anti-B

During a blood transfusion, it is essential that the recipient's blood does **not** contain antibodies to the donor's blood.

Which blood groups can be given to a person with blood group B?

- A** A and B **B** AB and B **C** AB and O **D** B and O

3. Question | 9700 Feb-March 2016 P1 V2 Q40

- 40** An enzyme hydrolyses the two heavy polypeptide chains of an antibody molecule. The hydrolysis occurs at the hinge region and breaks the antibody into three fragments.

How many of these fragments are able to bind to antigens?

- A** 0 **B** 1 **C** 2 **D** 3

4. Question | 9700 May-June 2016 P1 V1 Q37

- 37** A person whose immune system is suppressed may become more susceptible to certain diseases.

Which disease will this person **not** become more susceptible to?

- A** cholera
B measles
C sickle cell anaemia
D TB

39 Rabies is a viral disease which can be spread to humans by a bite from an infected animal.

One method of treatment is to inject the patient with antibodies specific to the rabies virus.

Which statements about this treatment are correct?

- 1 The patient will have natural passive immunity to rabies.
- 2 The injected antibodies will be broken down by the patient.
- 3 The patient's memory cells will be able to produce this antibody more rapidly in the future.
- 4 The immunity provided will only be of short duration.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

6. Question | 9700 May-June 2016 P1 V1 Q40

40 What are the functions of T-lymphocytes during an immune response?

- 1 destroy infected body cells
- 2 differentiate into memory cells
- 3 secrete antibodies

A 1 and 2 **B** 2 and 3 **C** 1 only **D** 3 only

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7. Question | 9700 May-June 2016 P1 V2 Q38

38 Which statement describes how passive natural immunity is obtained?

- A** A vaccination containing dead microorganisms is given.
- B** An immunisation containing specific antigens is given.
- C** Antibodies are passed from mother to developing baby.
- D** Antibodies from another individual are injected.

8. Question | 9700 May-June 2016 P1 V2 Q39

39 What describes a non-specific immune response?

- A** activation of killer T-lymphocytes by infected cells
- B** cloning of B-lymphocytes to form plasma cells
- C** ingestion of a bacterial cell by a neutrophil
- D** presentation of antigens on the cell surface of macrophages

9. Question | 9700 May-June 2016 P1 V2 Q40

40 What explains why monoclonal antibodies can be used to target cancer cells?

- A** Cancer cells have different antigens from normal body cells.
- B** Specific cancer drugs can be attached to the monoclonal antibody.
- C** They are one type of a specific antibody that binds to an antigen.
- D** They are secreted by hybridomas of cancer cells and B-lymphocytes.

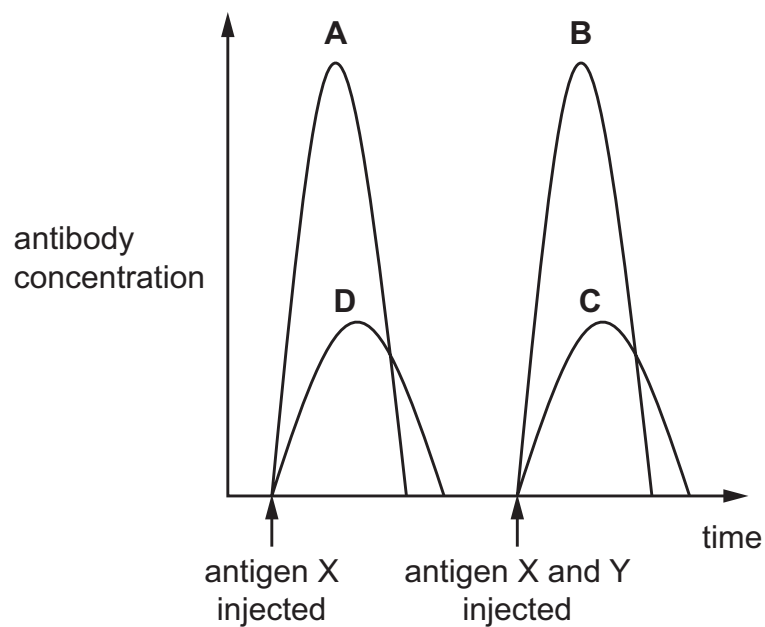
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- 39** The graph shows the antibody response when a person is injected first with antigen X and later with antigens X and Y.

Which curve shows the primary response to antigen Y?



11. Question | 9700 May-June 2016 P1 V3 Q40

40 Which row describes passive immunity?

	triggered by an antigen	involves an immune response	memory cells produced	permanent protection
A	✓	✓	✓	✓
B	✓	✓	✗	✗
C	✗	✗	✓	✓
D	✗	✗	✗	✗

key

✓ = true

✗ = false

12. Question | 9700 Oct-Nov 2016 P1 V1 Q38

38 What describes a function of a T-lymphocyte?

- A** They are only found in blood and secrete cytokines in response to infection.
- B** They can leave the blood and accumulate at sites of inflammation.
- C** They can leave the blood and secrete cytotoxins when exposed to bacteria.
- D** They circulate in the blood and always present antigens in response to infection.

39 A person's blood group is determined by antigens present on the red blood cells.

The table shows the antigens and antibodies in the blood of people with different blood groups.

blood group	antigens on red blood cells	antibodies in plasma
A	A	antibodies to B
B	B	antibodies to A
AB	A and B	neither
O	neither	antibodies to A and B

During a blood transfusion, it is essential that the recipient's blood does not contain antibodies to the donor's blood.

Which blood group can be given to a person with blood group AB?

- A** AB only
- B** O only
- C** B and A only
- D** A, B, AB and O

14. Question | 9700 Oct-Nov 2016 P1 V1 Q40

40 Which statement about immunity is correct?

- A** Antibody donation, but not antibody production, occurs with artificial active and artificial passive immunity.
- B** Artificial active immunity lasts for a greater length of time than natural passive immunity.
- C** Natural active immunity provides a faster response to infection than artificial active immunity.
- D** Recognition and binding by specific B-lymphocytes only occurs with natural immunity.

15. Question | 9700 Oct-Nov 2016 P1 V2 Q39

39 The following are all responses made by cells of the immune system to a pathogen.

- 1 mitosis
- 2 bind to infected cell
- 3 produce memory cells
- 4 secrete antibodies

Which of the responses is correct for β -lymphocytes?

- A** 1, 2, 3 and 4 **B** 1, 2 and 4 only **C** 1 and 3 only **D** 2, 3 and 4 only

40 What occurs when active immunity is artificially induced?

- A** Non-self antibodies attack self antigens.
- B** Non-self antigens attack self antibodies.
- C** Self antibodies attack non-self antigens.
- D** Self antigens attack non-self antibodies.

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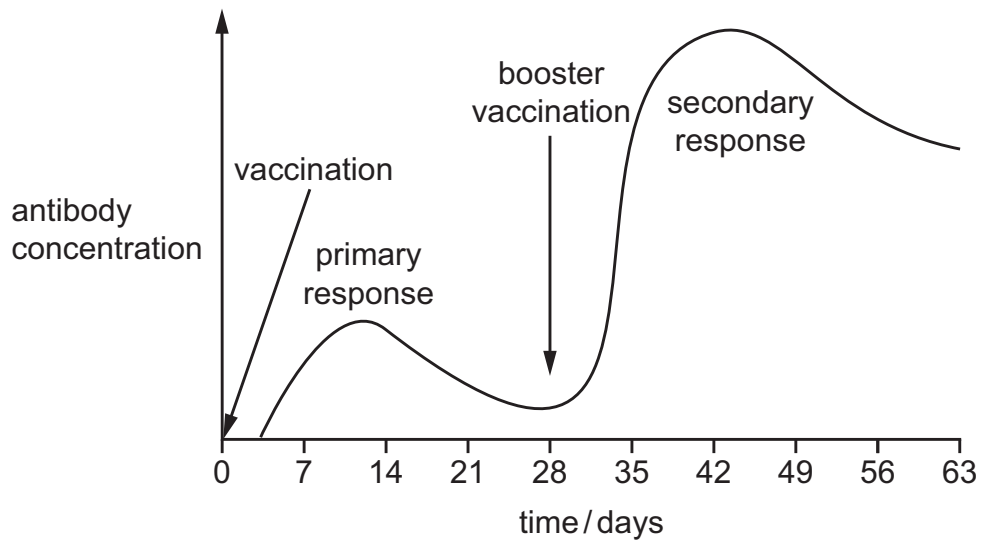
17. Question | 9700 Oct-Nov 2016 P1 V3 Q38

- 38** Which event will occur following antigen-antibody binding?
- A** agglutination of bacteria to reduce their spread
 - B** decreased susceptibility to phagocytosis
 - C** more helper T cells are activated by the release of cytokines
 - D** more plasma cells are cloned to produce more antigens

18. Question | 9700 Oct-Nov 2016 P1 V3 Q39

- 39** Which statements about macrophages are correct?
- 1 More are found in tissues such as the lungs, than in the blood.
 - 2 They have a role in antigen presentation.
 - 3 They can engulf pathogens, dust particles and damaged body cells.
- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

- 40** The graph shows the antibody concentration in blood following vaccination and a booster vaccination 28 days later.



Which statements about the changes in antibody concentration are correct?

- 1 Antibody concentration falls after the primary response because antibodies are broken down and are no longer being produced.
- 2 The secondary response is more rapid due to memory B cells produced from activated B cells in the primary response.
- 3 The secondary response lasts longer than the primary response because memory B cells live longer than plasma B cells.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

20 Some stem cells divide and give rise to phagocytes.

Where in the human body do these stem cells divide?

1 blood

2 bone marrow

3 lymph nodes

A 1, 2 and 3

B 1 and 3 only

C 2 only

D 3 only

21. Question | 9700 Feb-March 2017 P1 V2 Q39

39 Which of the statements could describe **both** B-lymphocytes and T-lymphocytes?

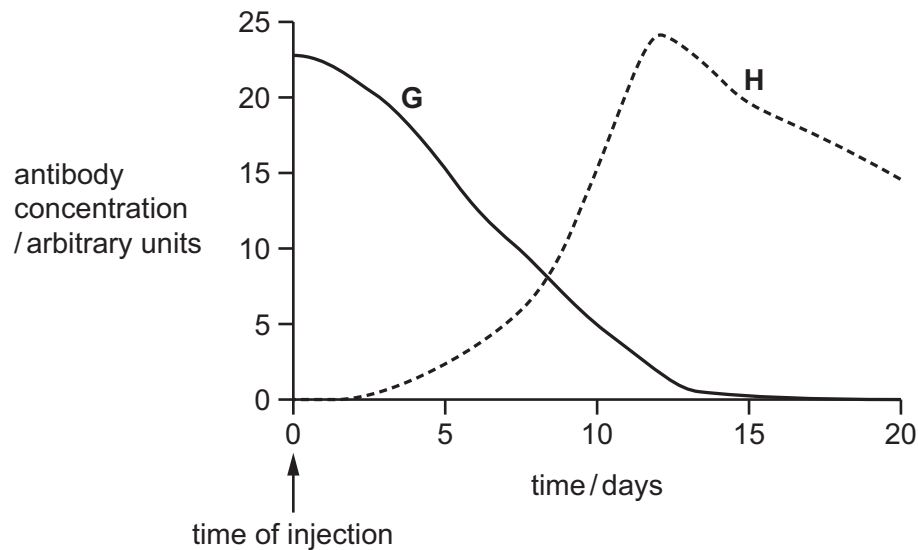
- 1 They contain specific protein receptors in their cell surface membranes.
- 2 They differentiate into plasma cells.
- 3 They divide by mitosis.

A 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

40 Two people, **G** and **H**, were each given an injection to protect them against a particular pathogen.

One person was injected with antibodies. The other person was injected with a vaccine.

The graph shows the concentrations of the antibody against this pathogen in the blood of the two people, **G** and **H**, over a period of 20 days following the injection.



Which row correctly describes the type of immunity shown by **G** and **H**?

	G	H
A	artificial active immunity	artificial passive immunity
B	artificial passive immunity	artificial active immunity
C	natural active immunity	natural passive immunity
D	natural passive immunity	artificial active immunity

23. Question | 9700 May-June 2017 P1 V1 Q40

- 40** B-lymphocytes and T-lymphocytes are often unable to respond to the antigens on pathogens that are intracellular parasites.

What is the reason for this?

- A** The antigens are constantly mutating.
- B** The antigens can destroy the lymphocytes.
- C** The lymphocytes do **not** encounter the antigens.
- D** The lymphocytes do **not** recognise the antigens.

24. Question | 9700 May-June 2017 P1 V2 Q39

- 39** When a person is given a vaccination immunity to certain pathogens develops.

Which of the effects of vaccination are correct?

- 1 production of antibodies to protect against future infections
- 2 results in artificial active immunity
- 3 stimulation of appropriate lymphocytes

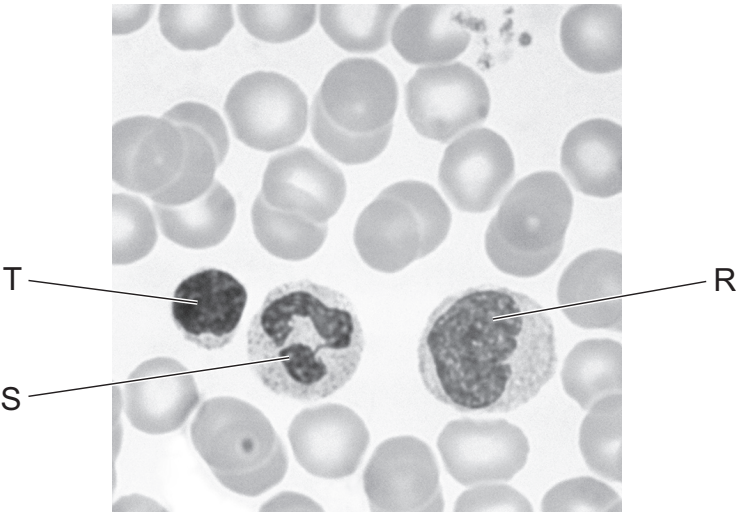
- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

25. Question | 9700 May-June 2017 P1 V2 Q40

40 What is the first response by the immune system to a pathogen?

- A** ingestion of the pathogen by phagocytes
- B** production of antibodies
- C** production of antigens
- D** stimulation of B memory cells

39 The photomicrograph shows human blood, with three types of white cell labelled.



Which row correctly identifies these white cells?

	cell R	cell S	cell T
A	lymphocyte	lymphocyte	lymphocyte
B	lymphocyte	phagocyte	phagocyte
C	phagocyte	lymphocyte	phagocyte
D	phagocyte	phagocyte	lymphocyte

27. Question | 9700 May-June 2017 P1 V3 Q40

40 A monoclonal antibody specific for a virus was produced.

This antibody was treated with an enzyme to break the bonds between the variable and constant regions.

The separated variable and constant regions were then added to cells infected with the virus.

Which statements are correct?

- 1 The constant regions would bind to different parts of the virus antigens.
- 2 The viruses could be engulfed by phagocytes if they were present.
- 3 The variable regions would all bind to the same part of the virus antigens.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

28. Question | 9700 Oct-Nov 2017 P1 V1 Q37

37 Which of these statements explain why some vaccines can be taken by mouth but tuberculosis (TB) vaccine has to be injected?

- 1 Macrophages present antigens in vaccines to stimulate an immune response.
- 2 The TB antigens necessary to produce an immune response are proteins which would be digested in the stomach and small intestine.
- 3 There are no B-lymphocytes and T-lymphocytes in the stomach.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 only

29. Question | 9700 Oct-Nov 2017 P1 V1 Q38

38 Which method of gaining immunity can be described as natural active immunity?

- A** feeding on colostrum
- B** inhaling the chicken pox virus
- C** injection with antibodies
- D** through the placenta

30. Question | 9700 Oct-Nov 2017 P1 V1 Q40

40 The statements refer to vaccination programmes for each of the diseases cholera, measles, smallpox and tuberculosis (TB).

Which statement is correct for TB?

- A** Most children are vaccinated before their first birthday.
- B** The pathogen has not mutated or changed its antigens.
- C** The pathogen lives in the intestine where antibodies cannot get to it.
- D** The vaccine is not effective against some strains of the pathogen.

39 Which sequence of events occurs during an immune response?

- 1 development of plasma cells
- 2 mitosis of B-lymphocytes
- 3 recognition of non-self antigens
- 4 secretion of antibodies

A 2 → 3 → 4 → 1

B 2 → 4 → 3 → 1

C 3 → 1 → 2 → 4

D 3 → 2 → 1 → 4

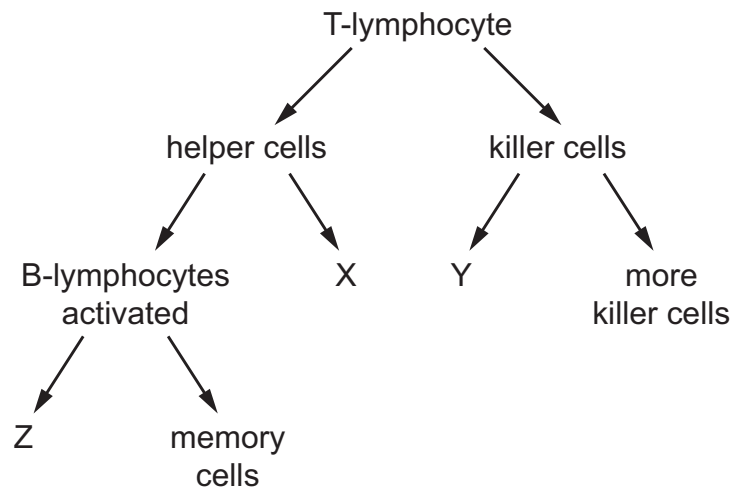
40 An influenza vaccine can be made by growing the viruses in chicken eggs.

The viruses are extracted in liquid from the eggs and inactivated. The purified egg extract containing the viruses is then used as the vaccine.

What is a side-effect of using this vaccine in some people?

- A** An auto-immune condition could occur.
- B** An immune response to egg antigens could occur.
- C** The egg antigens could cause infections.
- D** The influenza viruses could cause infections.

- 39** The flow diagram shows the events following activation of a T-lymphocyte by binding to antigens on an infected cell.



Which row correctly identifies X, Y and Z?

	X	Y	Z
A	memory cells	macrophages	antibodies
B	memory cells	memory cells	plasma cells
C	neutrophils	memory cells	plasma cells
D	plasma cells	neutrophil	memory cells

34. Question | 9700 Oct-Nov 2017 P1 V3 Q40

40 Smallpox was eradicated from the human population by a worldwide preventative programme.

Which type of immunity was triggered in people who were treated as part of this programme?

- A** artificial active immunity
- B** artificial passive immunity
- C** natural active immunity
- D** natural passive immunity

35. Question | 9700 Feb-March 2018 P1 V2 Q38

38 Some children are born with severe combined immunodeficiency (SCID).

Children with this inherited disease do not normally have any T-lymphocytes and suffer from many infectious diseases.

How may these children be cured from SCID?

- A** transfusion of antibodies
- B** treatment with stem cells
- C** use of different antibiotics
- D** vaccination against all diseases

36. Question | 9700 Feb-March 2018 P1 V2 Q39

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

37. Question | 9700 Feb-March 2018 P1 V2 Q40

- 40** A vaccine is used to create artificial active immunity. After being given a vaccine, it will take a period of time before a person develops long-term immunity against the disease.

Which statement about this period of time explains this delay?

- 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.

38. Question | 9700 May-June 2018 P1 V1 Q38

38 Hybridomas are used as a basis for the production of large numbers of monoclonal antibodies.

Which statement describes how hybridomas are made?

- A** fusing activated T-lymphocytes with cancer cells
- B** fusing B-lymphocytes with cancer cells
- C** fusing memory cells with cancer cells
- D** fusing T-lymphocytes with cancer cells

39. Question | 9700 May-June 2018 P1 V1 Q39

39 Which statement about the properties of the antigen binding sites in antibody molecules is correct?

- A** They are located on the light chains only.
- B** They have a hinge region to give flexibility for different antigens.
- C** They have binding sites for receptors on phagocytes.
- D** They have variable amino acid sequences for different antigens.

40. Question | 9700 May-June 2018 P1 V1 Q40

40 The statements describe ways in which different types of monoclonal antibodies can work.

- 1 binding to proteins on cell surfaces and triggering the immune system
- 2 blocking molecules on cell surfaces that inhibit T-cells
- 3 blocking cell signalling receptors that trigger cell division
- 4 blocking cell signalling receptors that trigger the immune response

Which types of monoclonal antibody could be used to treat cancer?

- A** 1, 2, 3 and 4
- B** 1, 2 and 3 only
- C** 1 and 4 only
- D** 2, 3 and 4 only

41. Question | 9700 May-June 2018 P1 V2 Q38

- 38** How many variable regions are there on a typical Y-shaped antibody molecule?
- A** 2 **B** 3 **C** 4 **D** 6

42. Question | 9700 May-June 2018 P1 V2 Q39

- 39** Where are antigens found?

	on the surface of pathogen	on the surface of macrophage
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key
✓ = antigens found
x = antigens not found

43. Question | 9700 May-June 2018 P1 V2 Q40

- 40** When an organ is transplanted from one person to another, rejection of the non-self organ must be avoided. At the same time, the immune system of the recipient must be maintained to prevent death from infections.

What prevents rejection of the transplanted organ?

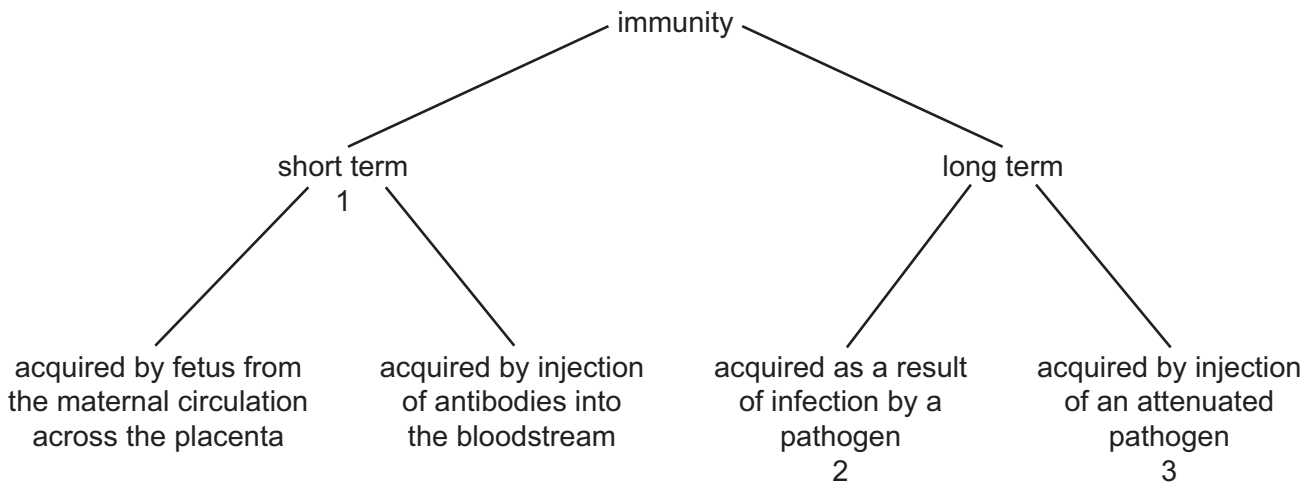
- A** continued activity of B-lymphocytes
- B** natural active immunity
- C** natural passive immunity
- D** suppression of T-lymphocyte activity

39 Where are antigens found?

	on the surface of pathogen	on the surface of macrophage	in blood plasma
A	✓	✓	x
B	✓	x	✓
C	x	✓	x
D	x	x	✓

key
✓ = antigens found
x = antigens not found

40 The diagram allows the identification of different types of immunity.



Which row correctly identifies the types of immunity labelled 1, 2 and 3?

	1	2	3
A	active	artificial	natural
B	active	natural	artificial
C	passive	artificial	natural
D	passive	natural	artificial

46. Question | 9700 Oct-Nov 2018 P1 V1 Q38

38 A vaccine is available against most common strains of the influenza virus.

The virus that causes influenza often undergoes mutation in the gene coding for its antigenic protein.

Which statements explain why vaccinated people are not immune to a mutated influenza virus?

- 1 They will not have primary immune response to the mutated antigen.
- 2 They will not have a secondary immune response to the mutated antigen.
- 3 Their memory cells do not recognise the mutated antigen.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

47. Question | 9700 Oct-Nov 2018 P1 V1 Q39

39 Which statements correctly describe lymphocytes?

- 1 Each B-lymphocyte has the ability to make several types of antibody molecules.
- 2 Some B-lymphocytes and T-lymphocytes become memory cells.
- 3 Plasma cells secrete antibodies into the blood plasma.
- 4 Some T-lymphocytes stimulate macrophages to kill infected cells.

A 1, 2, 3 and 4
B 1, 2 and 3 only
C 1 and 4 only
D 2, 3 and 4 only

- 40** Addison's disease can occur when antibodies are produced in response to an enzyme found in some organs of the body.

Which statements correctly describe Addison's disease?

- 1 It is a non-infectious disease.
- 2 It is a type of auto-immune disease.
- 3 Antibodies are produced against a self-antigen.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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49. Question | 9700 Oct-Nov 2018 P1 V2 Q38

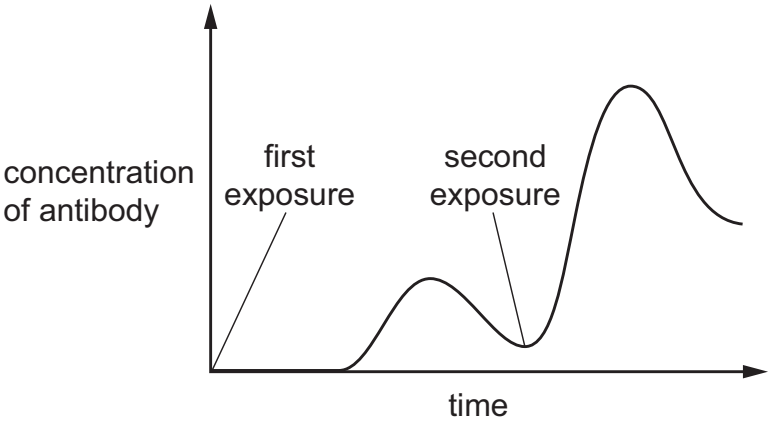
38 Where are antigens found?

	on the surface of macrophages	in blood plasma
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = antigens found
✗ = antigens not found

50. Question | 9700 Oct-Nov 2018 P1 V2 Q39

39 The graph shows how the body reacts following exposure to an antigen for the first and second time.



What is the direct cause of the increase in antibody production after the second exposure to antigens?

- A B-memory cells
- B macrophages
- C plasma cells
- D T-memory cells

51. Question | 9700 Oct-Nov 2018 P1 V2 Q40

40 Why has it proved difficult to develop an effective vaccine against malaria?

- A** Mosquitoes have many stages in their life cycles.
- B** The human immune system does not recognise the antigens of the parasite.
- C** The parasites can only be attacked when outside the liver cells and red blood cells.
- D** Vaccines are rapidly broken down by proteases in the stomach.

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37 A West African country introduced a measles vaccination during a measles epidemic.

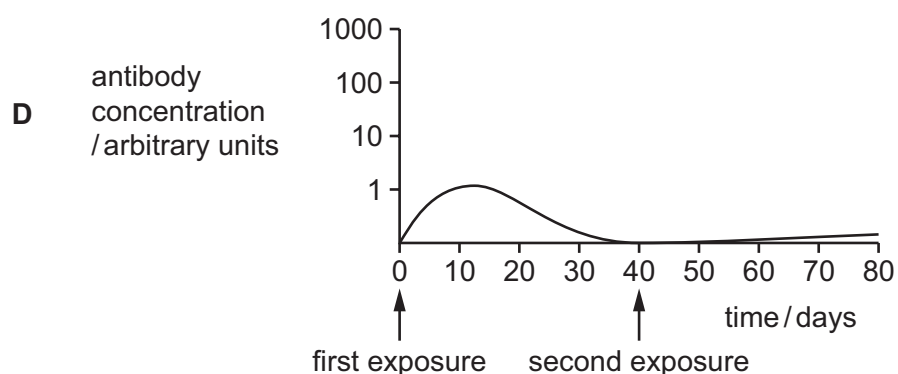
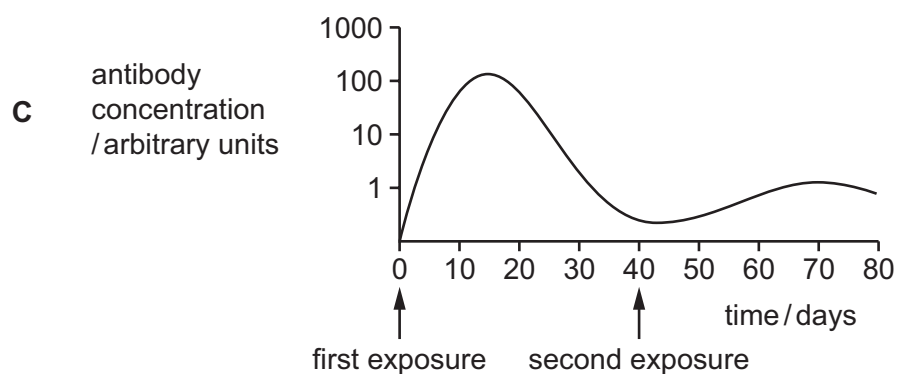
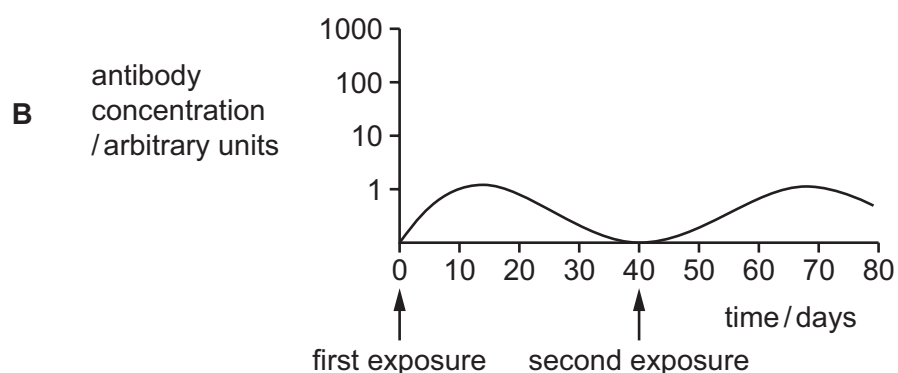
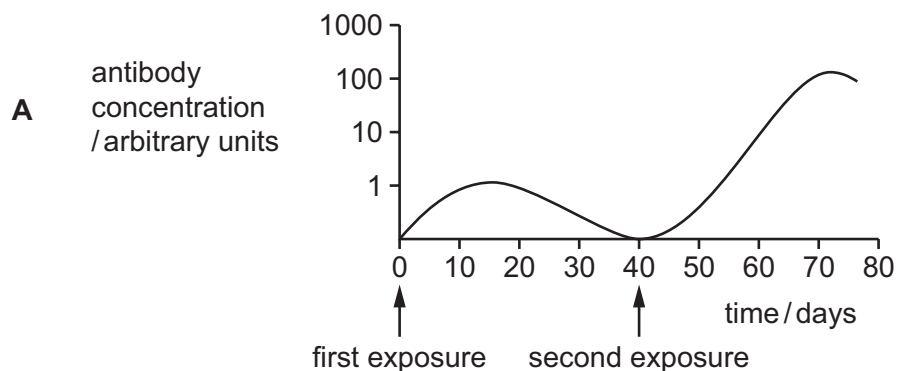
Later, it was realised that vaccinated children were more likely to survive childhood than unvaccinated children, even when there were no measles epidemics.

The vaccine had given the children some protection against other pathogenic infections.

Which statement could account for this extra protection?

- A** B-lymphocytes produced memory cells which gave the children passive immunity to these infections.
- B** Memory cells produced plasma cells which secreted anti-measles antibodies that bound to antigens that closely resembled measles antigens.
- C** Memory cells produced plasma cells which secreted anti-measles antibodies that bound to any antigen.
- D** T-lymphocytes produced memory cells which gave the children natural immunity against these other infections.

38 Which graph shows the changes in antibody concentration following a second exposure to the same infection?



39 Where are antigens found?

	on surface of pathogen	in blood plasma
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key
✓ = antigens found
x = antigens not found

- 40** Whooping cough is a highly infectious disease of the gas exchange system, caused by the bacterium *Bordetella pertussis*.

Which method provides protection to infants against whooping cough and reduces the chance of developing this disease later in life?

- A** a short course of more than one type of antibiotic
- B** a six month course of one type of antibiotic
- C** injections of antibody specific to *Bordetella pertussis*
- D** injections of dead *Bordetella pertussis* bacteria

56. Question | 9700 Feb-March 2019 P1 V2 Q29

29 Which row correctly identifies the locations in which a type of molecule or cell can be present?

	type of molecule or cell	blood	lymph	tissue fluid
A	antigens	✓	x	x
B	glucose	✓	x	✓
C	lymphocyte	x	✓	✓
D	neutrophil	✓	✓	✓

key

✓ = can be present

x = cannot be present

57. Question | 9700 Feb-March 2019 P1 V2 Q38

38 Why does the white blood cell count increase in people with leukaemia?

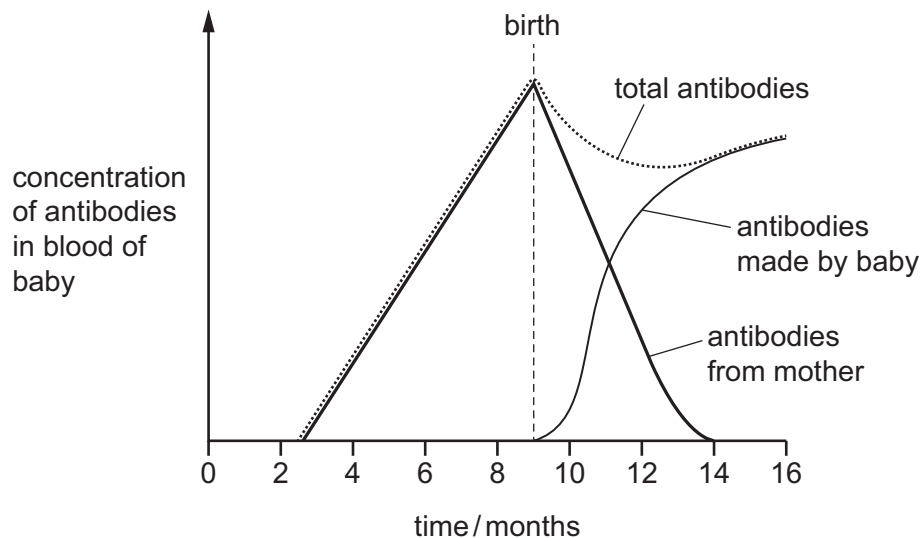
- A** More antibodies are required so there are more B-lymphocytes.
- B** More lymphocytes are produced in bone marrow.
- C** More memory cells are produced in plasma.
- D** More T-lymphocytes are required to stimulate the immune system.

39 Where are antibodies found during an immune response?

	on the surface of pathogens	on the surface of memory cells
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key
✓ = antibodies found
x = antibodies not found

- 40** The graph shows the changes that occur in the concentration of antibodies in the blood of a baby before birth and during the first few months after birth.



Which description about the changes in immunity during the first few months after birth is correct?

- A** active artificial immunity decreases, active natural immunity increases
- B** active natural immunity decreases, active artificial immunity increases
- C** passive artificial immunity decreases, active natural immunity increases
- D** passive natural immunity decreases, active natural immunity increases

60. Question | 9700 May-June 2019 P1 V1 Q39

39 Which statements describe myasthenia gravis?

- 1 Antibodies attack proteins within the body.
- 2 T-lymphocytes are involved in an inflammatory response.
- 3 The immune system blocks receptors at the neuromuscular junction.
- 4 The immune system attacks the central nervous system.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

61. Question | 9700 May-June 2019 P1 V1 Q40

40 Which row shows the cells that are able to divide continuously and are involved in monoclonal antibody production?

	cancer cells	mouse B-lymphocyte plasma cells	hybridoma cells
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = correct

✗ = not correct

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62. Question | 9700 May-June 2019 P1 V2 Q38

38 Which are specific immune responses?

- 1 phagocytosis
- 2 production of antibodies
- 3 production of memory cells

A 1 and 3 only **B** 1 only **C** 2 and 3 only **D** 2 only

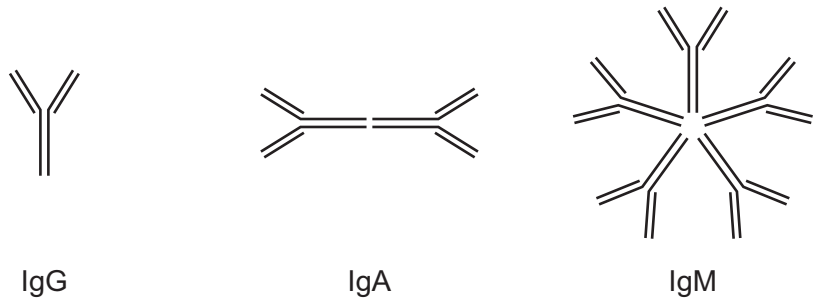
39 Newborn babies have natural passive immunity.

What is correct for this type of immunity?

	immunity is temporary	antibodies are broken down
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = correct
✗ = not correct

40 The diagrams show three different types of antibody structure.



Which row is correct?

	IgG	IgA	IgM
A	one binding site for an antigen molecule	two light chains	two heavy chains
B	two heavy chains	four binding sites for antigen molecules	five hinge regions
C	two hinge regions	four heavy chains	five light chains
D	two light chains	four hinge regions	ten binding sites for antigen molecules

39 Growth factors are chemicals that stimulate a cell to divide.

Growth factors are transported around the body in the blood, and they attach to cells that have complementary growth factor receptors on their surface.

Some cells have too many growth factor receptors on their surface and so the cells continue to divide, forming a tumour.

Trastuzumab is used as a treatment for some cancers.

Trastuzumab works by binding to a specific growth factor receptor on a tumour cell. This stops the cell dividing and the cell dies.

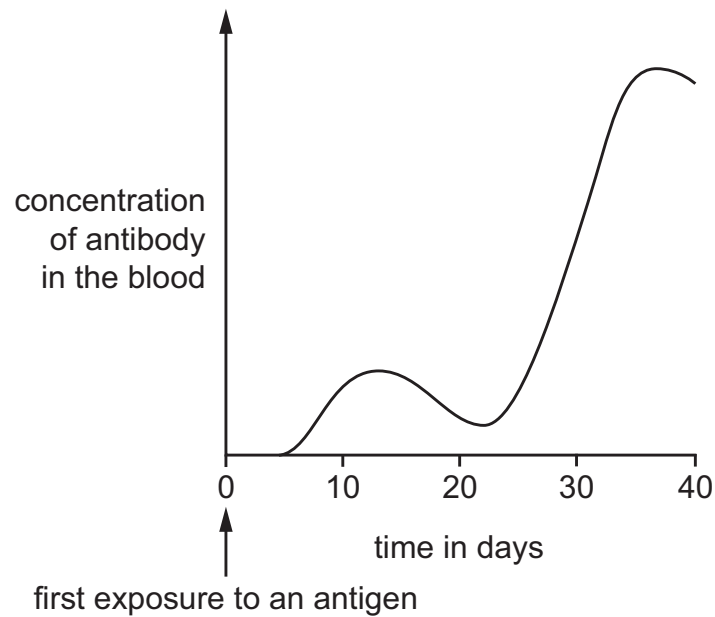
What is trastuzumab?

- A** a monoclonal antibody
- B** a vaccine
- C** an antibiotic
- D** an enzyme inhibitor

40 What describes artificial active immunity?

- A** protection against a pathogen by an injection of antibodies
- B** protection against a pathogen by drinking colostrum containing antibodies
- C** stimulation of lymphocytes by antigens contained in a vaccine
- D** stimulation of lymphocytes by antigens on the surface of invading pathogens

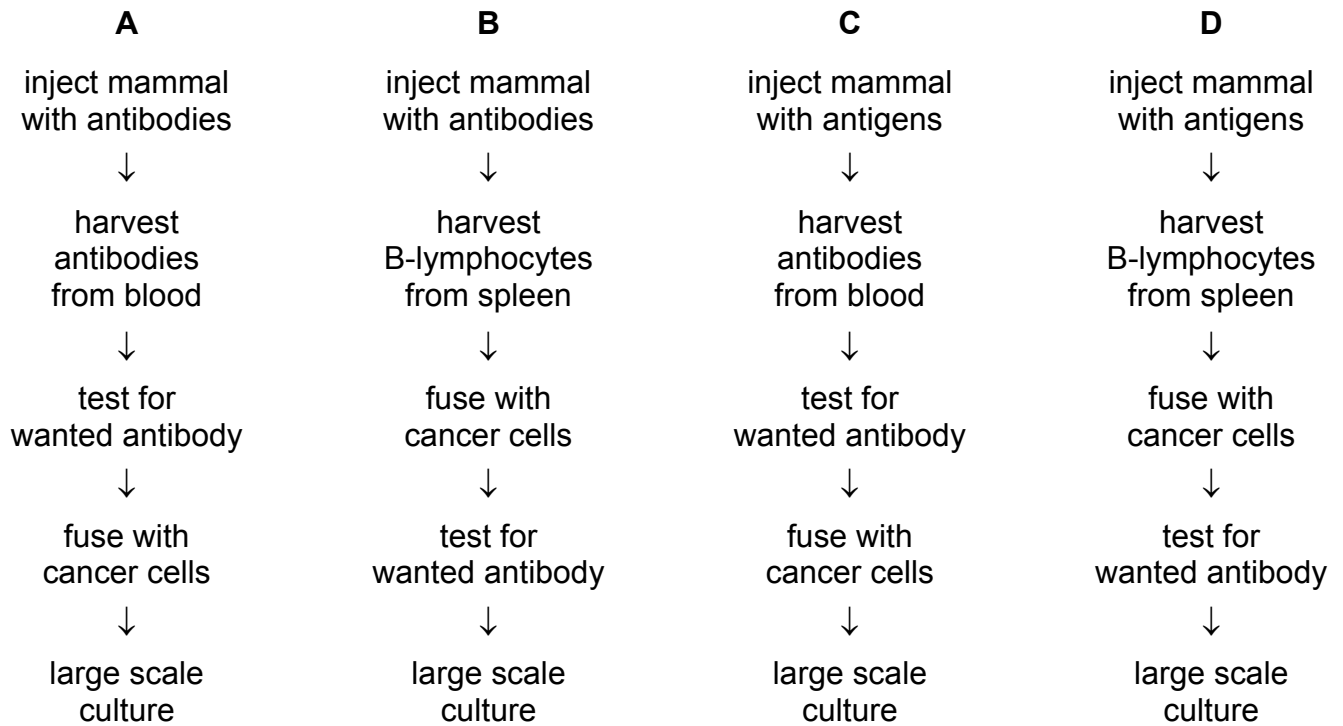
38 The graph shows the amount of antibody produced in response to an antigen.



From the graph, which statement is correct?

- A** It takes 25 days to achieve active immunity.
- B** Memory cells for this antigen are present in the body within 20 days.
- C** T-helper lymphocytes are activated on day 12.
- D** The second exposure to the antigen occurred on day 25.

39 Which sequence summarises the hybridoma method for the production of monoclonal antibodies?



- 40** The vaccination programme for smallpox was a medical success story which resulted in the World Health Organisation finally declaring the world free from smallpox in 1980.

Which statement correctly identifies the reasons for the success of the smallpox vaccination programme?

- A** The virus also infected animals making it easy to stop the transmission cycle.
- B** The virus remained in the body following infection and could become active later.
- C** The virus was stable and not prone to mutations.
- D** The virus was unstable and prone to mutations.

29 Which row correctly identifies the molecules or cells that are present in the different locations?

	type of molecule or cell	blood	lymph	tissue fluid
A	antibodies	x	✓	✓
B	large plasma proteins	✓	x	✓
C	lymphocytes	✓	✓	x
D	phagocytes	✓	✓	✓

key

✓ = present

x = not present

38 Immune response to a vaccination against a virus can be assessed by making three measurements:

- 1 the concentration of anti-virus antibody in the blood
- 2 the time taken to increase the antibody concentration significantly after a booster vaccination
- 3 the number of virus-specific lymphocytes per cm³ blood.

What describes the immunity of an individual when the values of 1, 2 and 3 are all low ten years after vaccination?

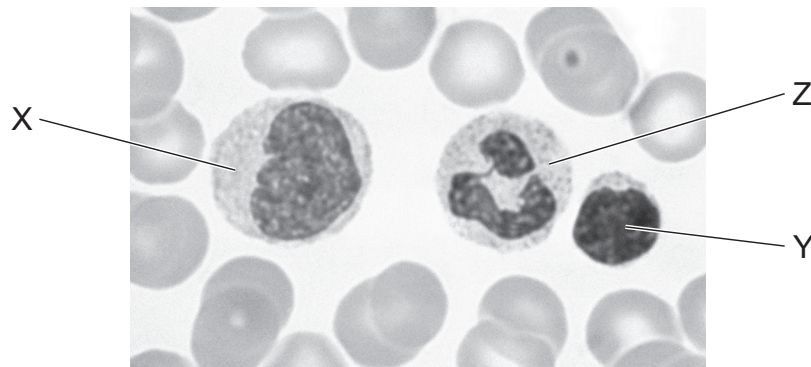
- A** active immunity due to the presence of memory cells
- B** low immunity due to the absence of antibodies
- C** low immunity due to the absence of memory cells
- D** passive immunity due to the presence of antibodies

40 Which features of monoclonal antibodies make them useful in the diagnosis and treatment of disease?

- 1 A particular monoclonal antibody attaches to a specific antigen.
- 2 Identical monoclonal antibodies can be produced in large numbers.
- 3 Binding a monoclonal antibody to its specific antigen may mark that antigen for destruction by white blood cells.
- 4 Fluorescent or radioactive markers can be attached to a monoclonal antibody to show where the antigen is in the body.

- A** 1, 2, 3 and 4
- B** 1, 2 and 3 only
- C** 2 and 3 only
- D** 3 and 4 only

29 The image shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

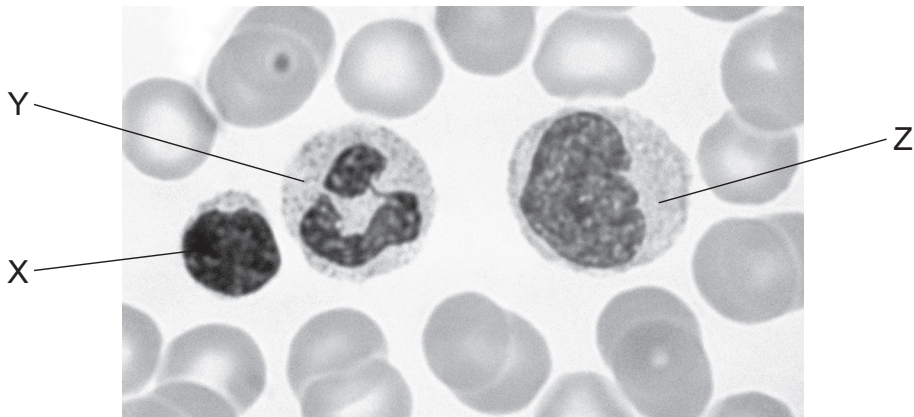
	cell X	cell Y	cell Z
A	lymphocyte	neutrophil	monocyte
B	lymphocyte	monocyte	neutrophil
C	monocyte	lymphocyte	neutrophil
D	neutrophil	lymphocyte	monocyte

74. Question | 9700 Oct-Nov 2019 P1 V3 Q40

40 What explains why monoclonal antibodies are useful in the diagnosis of disease?

- A** They bind to and neutralise one type of antibody.
- B** They bind to and neutralise one type of pathogen.
- C** Their shape is complementary to one specific antibody.
- D** Their shape is complementary to one specific antigen.

28 The photomicrograph shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	monocyte	neutrophil
B	lymphocyte	neutrophil	monocyte
C	monocyte	neutrophil	lymphocyte
D	neutrophil	monocyte	lymphocyte

29 Which row correctly identifies the locations in which a type of molecule or cell is present?

	type of molecule or cell	blood	lymph	tissue fluid
A	antibody	✓	✓	✓
B	large plasma protein	✓	x	✓
C	lymphocyte	✓	✓	x
D	phagocyte	x	✓	✓

key
✓ = present
x = not present

77. Question | 9700 Feb-March 2020 P1 V2 Q38

38 Which row correctly describes B-lymphocytes?

	processed in the thymus	release antibodies immediately after formation
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = correct

✗ = incorrect

78. Question | 9700 Feb-March 2020 P1 V2 Q39

39 Which features of monoclonal antibodies are important to their use in the treatment of cancer?

- 1 They can bind to tumour-associated antigens.
- 2 They can distinguish between different strains of pathogens.
- 3 They can deliver drugs to specific targets.

	1	2	3
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✓
D	✓	✗	✗

key

✓ = is important

✗ = is not important

40 A student was asked to explain why vaccination has successfully eradicated smallpox but not other diseases, such as measles, malaria and sickle cell anaemia. These are the statements made by the student.

- 1 The antigens of the virus causing smallpox did not change, unlike the antigens of the virus causing measles.
- 2 Sickle cell anaemia has many different types of mutation, unlike smallpox, so each would require a vaccine.
- 3 Unlike smallpox, malaria involves animals as part of the transmission cycle and this makes the cycle harder to break.
- 4 The vaccine against measles often causes a poor primary immune response so that booster vaccines are required, unlike the vaccine against smallpox.

Which statements are possible explanations?

- A** 1, 3 and 4 **B** 1 and 2 **C** 1 and 4 only **D** 2 and 4

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80. Question | 9700 May-June 2020 P1 V1 Q39

39 Which row correctly describes the type of immunity gained from being injected with an antitoxin?

	active	artificial	passive	natural
A	✓	✓	✗	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✗	✓	✓

key

✓ = correct

✗ = not correct

81. Question | 9700 May-June 2020 P1 V1 Q40

40 Where are antibodies found during an immune response?

	on surface of pathogen	in blood plasma
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

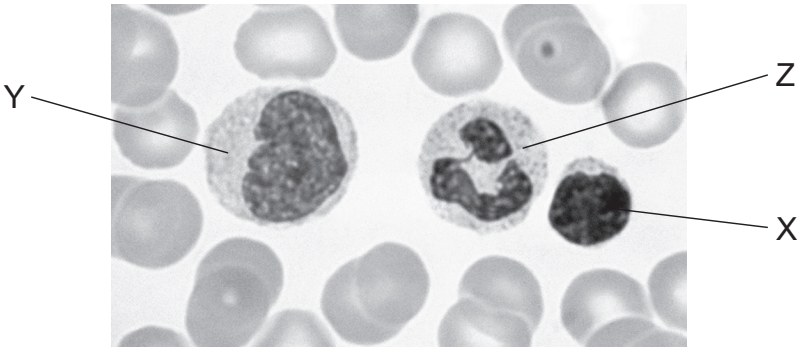
key

✓ = antibodies found

✗ = antibodies not found

82. Question | 9700 May-June 2020 P1 V2 Q28

28 The photomicrograph shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	monocyte	neutrophil
B	lymphocyte	neutrophil	monocyte
C	monocyte	neutrophil	lymphocyte
D	neutrophil	monocyte	lymphocyte

83. Question | 9700 May-June 2020 P1 V2 Q38

38 A blood cell count can indicate how many white blood cells there are in the blood.

Where else in the body are white blood cells found?

- 1 bone marrow
- 2 lymph
- 3 lungs

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

- 39** Myasthenia gravis is a disease that results from the immune system failing to distinguish between self and non-self. Antibodies bind to a component of the junctions between a muscle and its nerve.

What correctly describes Myasthenia gravis?

- A** Impulses in the nerve to the affected muscle cannot be blocked.
- B** The affected muscle cannot be repeatedly stimulated.
- C** The affected muscle is permanently stimulated.
- D** The nerve to the affected muscle does not carry any nerve impulses.

- 40** A monoclonal antibody, specific for a virus, was treated with an enzyme to break the bonds between the variable and constant regions.

The separated variable and constant regions were then added to cells infected with the virus.

Which statements are correct?

- 1 The constant regions would bind to different parts of the virus antigens.
- 2 The viruses could be engulfed by phagocytes if they were present.
- 3 The variable regions would all bind to the same part of the virus antigens.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

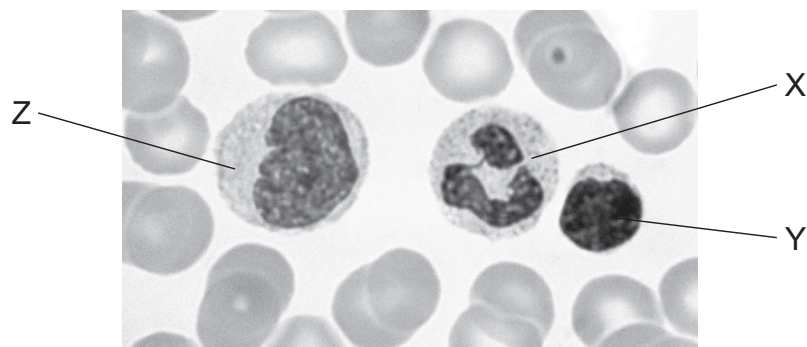
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86. Question | 9700 May-June 2020 P1 V3 Q29

29 The photomicrograph shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	neutrophil	monocyte
B	lymphocyte	monocyte	neutrophil
C	monocyte	lymphocyte	neutrophil
D	neutrophil	lymphocyte	monocyte

87. Question | 9700 May-June 2020 P1 V3 Q39

39 Which method of gaining immunity can be described as natural active immunity?

- A** feeding on colostrum
- B** inhaling the chicken pox virus
- C** injection with antibodies
- D** through the placenta

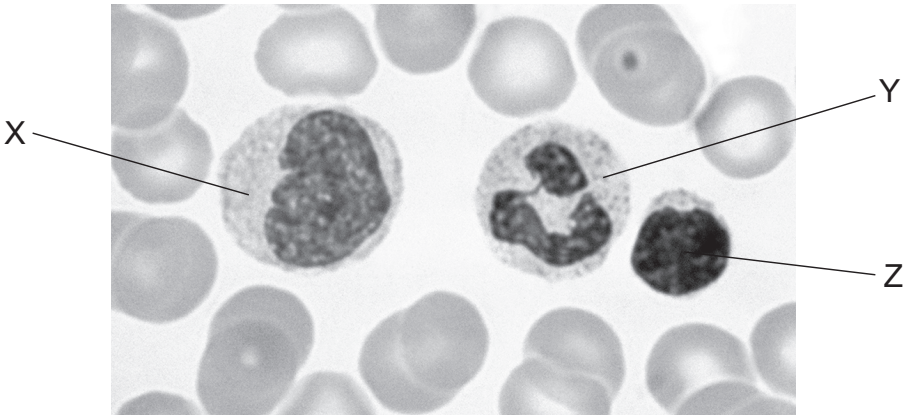
88. Question | 9700 May-June 2020 P1 V3 Q40

40 Which statements correctly explain why smallpox has been eradicated, but not malaria or cholera?

- 1 Cholera vaccines provide only short-term immunity.
- 2 Plasmodium antigens change during the life cycle.
- 3 Smallpox antigens remain stable.
- 4 Vaccines only work against viruses.

- A** 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

29 The photomicrograph shows three white blood cells labelled X, Y and Z.

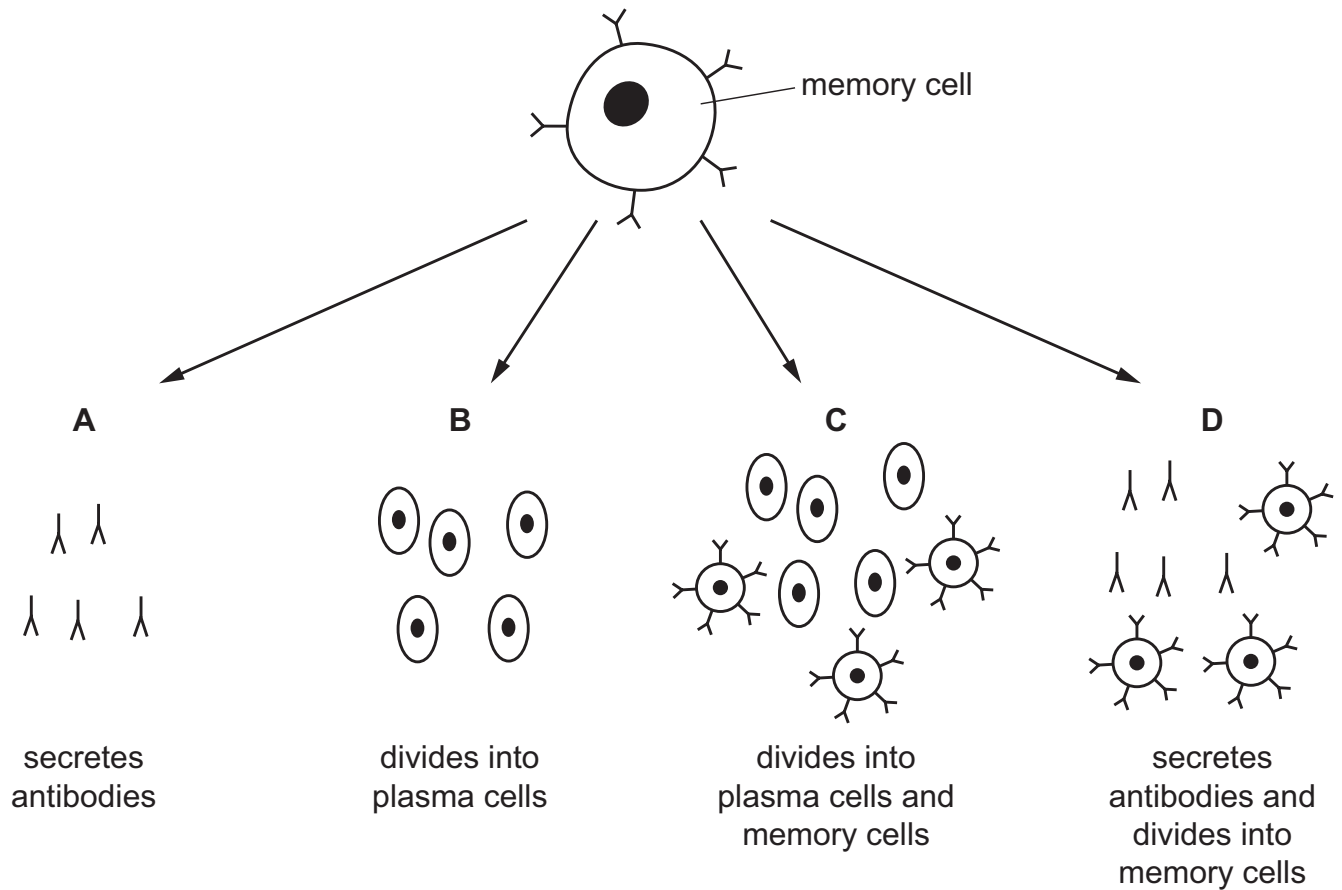


Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	monocyte	neutrophil
B	lymphocyte	neutrophil	monocyte
C	monocyte	neutrophil	lymphocyte
D	neutrophil	monocyte	lymphocyte

- 38** When exposed to an antigen for a second time, memory cells stimulate a secondary immune response.

Which correctly shows the secondary immune response?



- 39** Monoclonal antibodies are produced for use in diagnosis or treatment of disease. To obtain the antibodies for an antigen, a mouse is injected with the antigen.

Some of the events in the production of the monoclonal antibody are listed.

- 1 Plasma cells are fused with cancer cells to form a hybridoma.
- 2 Hybridomas that secrete the required antibody are identified and cloned.
- 3 B-lymphocytes that recognise the antigen multiply and become plasma cells.
- 4 Hybridomas divide by mitosis and secrete antibodies.
- 5 Plasma cells are removed from the mouse spleen.

What is the sequence of the first four events in the production of the monoclonal antibody?

- A** 3 → 5 → 1 → 2
- B** 3 → 5 → 1 → 4
- C** 5 → 1 → 2 → 4
- D** 5 → 1 → 4 → 2

40 Which row describes passive immunity?

	triggered by an antigen	involves an immune response	memory cells produced	permanent protection
A	✓	✓	✓	✓
B	✓	✓	✗	✗
C	✗	✗	✓	✓
D	✗	✗	✗	✗

key

✓ = correct

✗ = not correct

38 Which row is correct for neutrophils and B-lymphocytes?

	neutrophil	B-lymphocyte
A	can change shape	activated by contact with antigens
B	found in organs rather than in blood	kill virus-infected cells
C	may be long-lived cells	always short-lived cells
D	their lysosomal enzymes digest bacteria	secrete cytokines

39 Rabies is usually a fatal disease. Rabies is transmitted to people in the saliva of infected animals.

A person who has been bitten by an infected animal needs immediate treatment.

The treatment is a vaccination against rabies **and** an injection containing antibodies to the rabies antigen.

What type of immunity is given by the injection of antibodies?

- A** artificial active
- B** artificial passive
- C** natural active
- D** natural passive

40 A graft of tissue, such as skin, from a different person is usually rejected by the body.

Which statement about graft rejection is correct?

- A** The graft is rejected by B-lymphocytes because they make and release antibodies which react with the surface antigens on the graft cells.
- B** The graft is rejected by B-lymphocytes because T-lymphocytes are not stimulated to produce antibodies.
- C** The graft is rejected by T-lymphocytes because the graft tissue causes T-lymphocytes to release antibodies.
- D** The graft is rejected by T-lymphocytes because they circulate in the blood and can gather at the graft site.

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96. Question | 9700 Oct-Nov 2020 P1 V3 Q13

13 Lysozyme occurs in human tears, saliva, milk and mucus.

Lysozyme has a role in the immune system and hydrolyses peptidoglycan.

Which description of lysozyme is correct?

- A** It is an extracellular antibody.
- B** It is an intracellular antibody.
- C** It is an extracellular antibacterial protein.
- D** It is an intracellular antibacterial protein.

97. Question | 9700 Oct-Nov 2020 P1 V3 Q29

29 Which row is correct for the location of a type of molecule or cell?

	type of molecule or cell	blood	lymph	tissue fluid
A	antibodies	x	✓	✓
B	plasma proteins	✓	x	x
C	lymphocytes	✓	✓	✓
D	phagocytes	✓	x	✓

key

✓ = present

x = not present

98. Question | 9700 Oct-Nov 2020 P1 V3 Q38

38 Muscle cells have cell surface receptors for the neurotransmitter, ACh. These receptors allow the muscle to respond to a nerve impulse.

In the condition myasthenia gravis, the helper T cells stimulate a clone of B cells to become plasma cells and secrete antibodies that bind to and block these ACh receptors. The muscles cannot be stimulated and begin to break down.

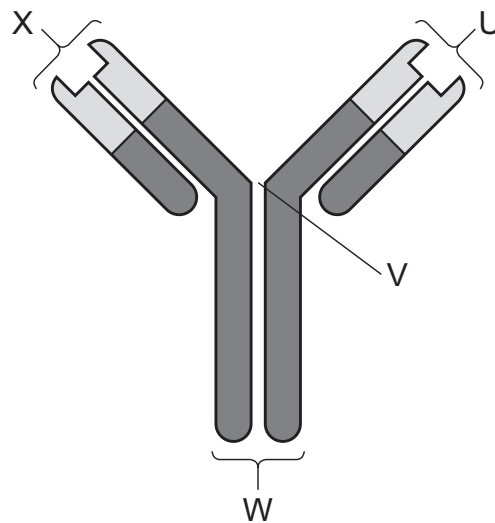
A short-term treatment for myasthenia gravis is to inject monoclonal antibodies into the blood.

What is the target of these monoclonal antibodies?

- A** antibodies that bind to ACh receptors
- B** muscle cell surface ACh receptors
- C** plasma cells secreting anti-ACh receptor antibodies
- D** the stimulating neurotransmitter ACh

99. Question | 9700 Oct-Nov 2020 P1 V3 Q39

39 The diagram shows the simplified structure of an antibody.



Which statement is correct?

- A** U and X allow the antibody to bind to two different antigens.
- B** V allows the antibody to fit around the antigen.
- C** W can bind to one specific antigen.
- D** X can bind with a specific phagocyte receptor.

100. Question | 9700 Oct-Nov 2020 P1 V3 Q40

40 Why have vaccination programmes eradicated smallpox but not TB?

- A** Vaccination can provide immunity only for smallpox but not for TB.
- B** Only TB is associated with poor living conditions.
- C** The smallpox virus showed little variation of antigens.
- D** The TB pathogen is a bacterium and the smallpox pathogen is a virus.

101. Question | 9700 Feb-March 2021 P1 V2 Q39

- 39** People with the autoimmune disease myasthenia gravis can have a treatment to relieve the symptoms. In this treatment, one of the components of their blood is removed.

Which blood component is removed?

- A** antibodies
- B** macrophages
- C** neutrophils
- D** red blood cells

102. Question | 9700 Feb-March 2021 P1 V2 Q40

- 40** Why are spleen cells fused with myeloma cells during monoclonal antibody production?

- A** so that the antibodies become specific for the necessary antigen
- B** so that the resulting hybridoma cells can reproduce indefinitely
- C** to allow antibodies that are **not** specific for the required antigen to be removed
- D** to increase the rate of production of antibodies produced by the hybridoma cells

103. Question | 9700 May-June 2021 P1 V1 Q38

- 38** What are functions of T-lymphocytes?

- 1 production of cytokines
- 2 production of toxins
- 3 recognition of an antigen bound to an antigen-presenting cell

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

39 What is correct about the role of memory cells in long-term immunity?

- 1 They divide to form plasma cells and memory cells when the pathogen enters the body a second time.
- 2 They produce a fast response so that the person infected with the pathogen does not become ill again.
- 3 They produce more antibodies than were produced during the primary immune response.
- 4 They remain in the blood and lymphatic system after the pathogen has been destroyed.

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1 and 3 only **D** 2 and 4 only

105. Question | 9700 May-June 2021 P1 V1 Q40

40 Which events result in a person developing actively acquired immunity?

- 1 becoming infected by TB bacteria
- 2 drinking breast milk
- 3 receiving an injection of antigens
- 4 receiving an injection of antibodies

A 1, 2 and 3 **B** 1, 3 and 4 **C** 1 and 3 only **D** 2 and 4

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106. Question | 9700 May-June 2021 P1 V2 Q36

- 36** Which statement explains why a one-dose vaccination programme for measles has not yet eliminated the disease?
- A** Many infants under the age of eight months have passive immunity.
 - B** Some children need several booster doses to develop full immunity.
 - C** The one-dose measles vaccine has a success rate of 93%.
 - D** The virus does not often change its antibodies.

107. Question | 9700 May-June 2021 P1 V2 Q38

- 38** What explains why monoclonal antibodies can be used to target cancer cells?
- A** Cancer cells have different antigens from normal body cells.
 - B** Specific cancer drugs can be attached to the monoclonal antibody.
 - C** They secrete a type of antigen that binds to a specific antibody.
 - D** They are secreted by hybridomas of cancer cells and B-lymphocytes.

39 Which statements correctly describe lymphocytes?

- 1 Each B-lymphocyte has the ability to make several types of antibody molecules.
- 2 Some B-lymphocytes and T-lymphocytes become memory cells.
- 3 Plasma cells secrete antibodies into the blood plasma.
- 4 Some T-lymphocytes stimulate macrophages to kill infected cells.

- A** 1, 2, 3 and 4
- B** 1, 2 and 3 only
- C** 1 and 4 only
- D** 2, 3 and 4 only

40 A country introduced a measles vaccination during a measles epidemic.

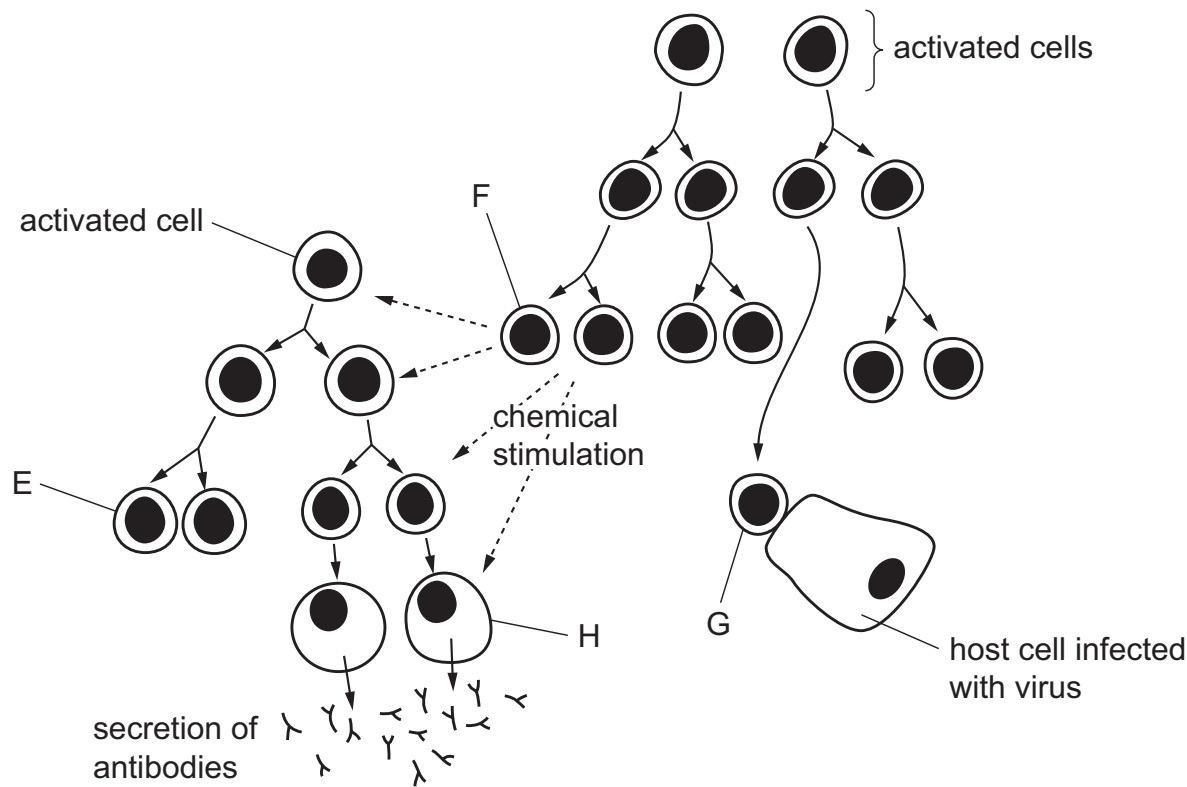
Later, it was realised that vaccinated children were more likely to survive childhood than unvaccinated children, even when there were no measles epidemics.

The vaccine had given the children some protection against other pathogenic infections.

Which statement could account for this extra protection?

- A** B-lymphocytes produced memory cells which gave the children passive immunity to these infections.
- B** Memory cells produced plasma cells which secreted anti-measles antibodies that bound to antigens that closely resembled measles antigens.
- C** Memory cells produced plasma cells which secreted anti-measles antibodies that bound to any antigen.
- D** T-lymphocytes produced memory cells which gave the children natural immunity against these other infections.

39 The diagram shows the immune response following infection by a virus.



Which row identifies the cells labelled E, F, G and H?

	E	F	G	H
A	B-memory cell	T-helper cell	T-killer cell	plasma cell
B	B-memory cell	T-memory cell	macrophage	plasma cell
C	plasma cell	T-memory cell	T-helper cell	B-memory cell
D	T-killer cell	B-memory cell	macrophage	T-helper cell

111. Question | 9700 May-June 2021 P1 V3 Q40

- 40** Monoclonal antibodies are used to test for the presence of the hormone HCG in the urine of a human female during early pregnancy.

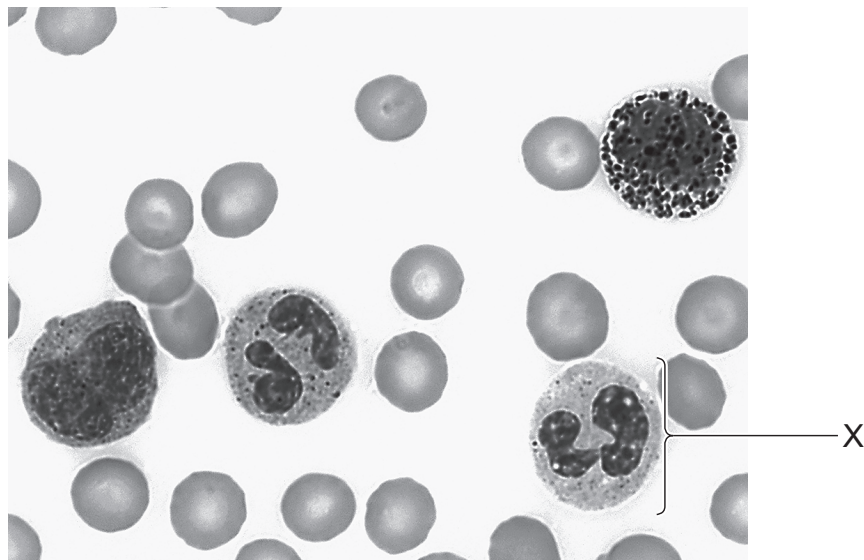
Which statements describe how the monoclonal antibodies used in this test are produced?

- 1 HCG is injected into a mouse, and plasma cells in the mouse produce antibodies specific to HCG.
- 2 Antibodies are extracted from the mouse and then fused with cancer cells to produce hybridoma cells.
- 3 Single hybridoma cells are cultured and they divide by mitosis to produce a clone of hybridoma cells.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

112. Question | 9700 Oct-Nov 2021 P1 V1 Q30

- 30** The photomicrograph shows human blood cells.



What type of blood cell is X?

- A** B-lymphocyte
B monocyte
C phagocyte
D T-lymphocyte

113. Question | 9700 Oct-Nov 2021 P1 V1 Q38

- 38** Which description of a T-lymphocyte is correct?
- A** They are only found in blood and secrete cytokines in response to infection.
 - B** They can leave the blood and accumulate at sites of inflammation.
 - C** They can leave the blood and secrete cytotoxins when exposed to bacteria.
 - D** They circulate in the blood and always present antigens in response to infection.

114. Question | 9700 Oct-Nov 2021 P1 V1 Q39

- 39** Where are antibodies found during an immune response?

	on the surface of memory cells	in blood plasma
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = antibodies found
✗ = antibodies not found

- 40** Monoclonal antibodies are used in the diagnosis and treatment of disease. They are produced using a technique known as cell fusion.

Which two structures are fused together in this technique?

- A** antigens and hybridoma cells
- B** T-lymphocytes and cancer cells
- C** cancer cells and plasma cells
- D** hybridoma cells and antibodies

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116. Question | 9700 Oct-Nov 2021 P1 V2 Q40

- 40** Which cell type causes the secondary immune response to be much faster than the primary immune response?
- A** helper T-lymphocyte
 - B** memory cell
 - C** phagocyte
 - D** plasma cell

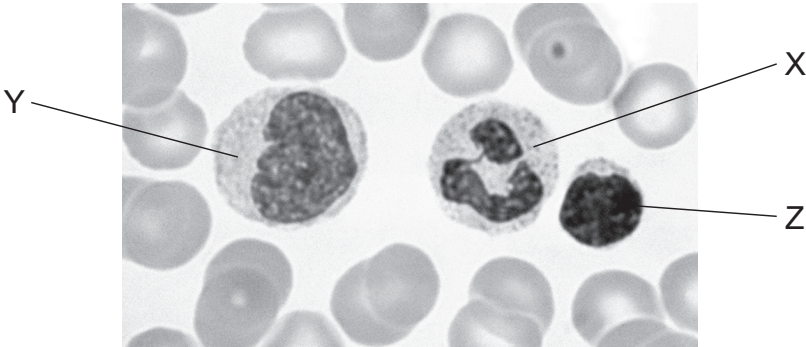
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117. Question | 9700 Oct-Nov 2021 P1 V3 Q30

- 30** The photomicrograph shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	monocyte	neutrophil
B	lymphocyte	neutrophil	monocyte
C	monocyte	neutrophil	lymphocyte
D	neutrophil	monocyte	lymphocyte

118. Question | 9700 Oct-Nov 2021 P1 V3 Q38

38 Which row about a person with leukaemia only and about a person with measles only is correct?

	white blood cell count in a person with leukaemia only	bone marrow function in a person with leukaemia only	white blood cell count in a person with measles only
A	decreased	increased	decreased
B	decreased	decreased	increased
C	increased	normal	decreased
D	increased	increased	increased

119. Question | 9700 Oct-Nov 2021 P1 V3 Q39

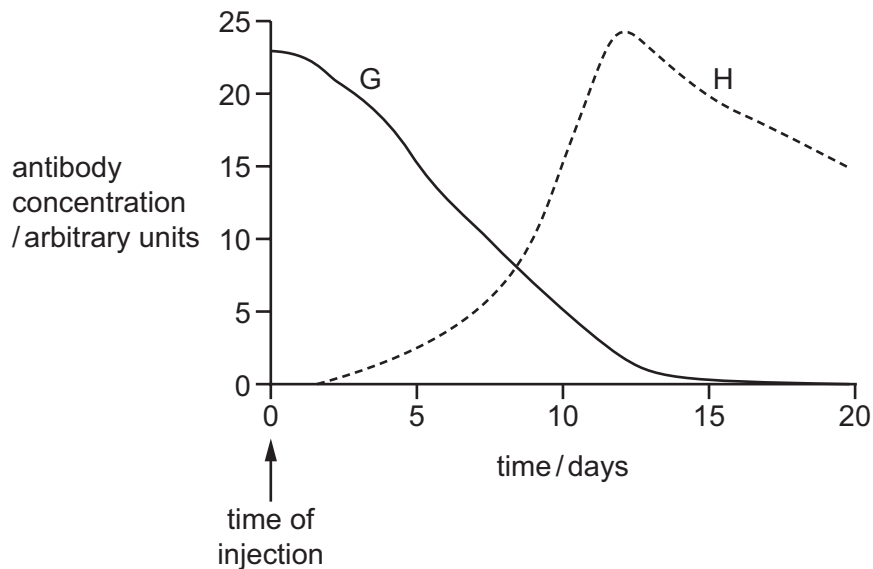
39 What is the cause of symptoms of people with myasthenia gravis?

- A** antibodies block receptor molecules on the cell surface membrane of muscle cells
- B** it is an autoimmune disease where self-antigens attack antibodies
- C** the destruction of T-lymphocytes, which have receptors complementary to self-antigens
- D** the loss of cell surface membrane receptors in nerve cells found in the spinal cord

40 Tetanus is a bacterial infection.

The graph shows the blood antibody concentration of two people.

On day 0, person G was injected with antibodies to the tetanus toxin and person H was injected with the vaccine for tetanus.



What could be the result if G and H were infected with the tetanus bacteria on day 20?

- A** Tetanus antibodies would not be produced in person G.
- B** Antibody production would peak after day 32 in person G.
- C** Antibody concentration would stay constant in person H.
- D** A second antibody peak would occur in person H that would be lower than the first peak.

9700 Biology Paper 1 - Immunity

Topical questions | 189 questions

121. Question | 9700 Feb-March 2022 P1 V2 Q39

39 In the hybridoma method, what is grown by cell culture to produce monoclonal antibodies?

- A** antigens
- B** clones
- C** lymphocytes
- D** myeloma cells

122. Question | 9700 Feb-March 2022 P1 V2 Q40

40 Which type of immunity does a baby have at birth?

- A** active artificial
- B** active natural
- C** passive artificial
- D** passive natural

- 38** T-lymphocytes have a protein, PD-1, on their surface. Some cancer cells have a receptor molecule on their surface which binds with PD-1, inactivating the T-lymphocyte.

A monoclonal antibody, lambrolizumab, has been produced against this receptor.

Trials showed that in 54 of 135 people with advanced skin cancer who were given lambrolizumab the tumours more than halved in volume. In six of the 57 people who were given the highest dose the tumours disappeared.

What may be correctly concluded from this information?

- 1 Lambrolizumab binds with a receptor on the surface of skin cancer cells.
 - 2 Cancer cells to which lambrolizumab is bound cannot inactivate T-lymphocytes.
 - 3 Lambrolizumab targets and kills skin cancer cells.
 - 4 Lambrolizumab allows a patient's own immune system to kill cancer cells.
- A** 1, 2, 3 and 4
- B** 1, 2 and 4 only
- C** 1 and 3 only
- D** 2, 3 and 4 only

39 A person's blood group is determined by antigens present on the red blood cells.

The table shows the antigens and antibodies in the blood of people with different blood groups.

blood group	presence of A or B antigens on red blood cells	presence of antibodies to A or B in plasma
A	A only	anti-B only
B	B only	anti-A only
AB	A and B	neither
O	neither	anti-A and anti-B

During a blood transfusion, it is essential that the person receiving the blood does not have antibodies to the donor's blood.

Which blood groups can be given to a person with blood group AB?

- A** AB only
- B** O only
- C** A and B only
- D** A, B, AB and O

125. Question | 9700 May-June 2022 P1 V1 Q40

40 Which types of cell are stimulated to divide by the cytokines produced by T-helper cells?

- A** macrophages
- B** B-lymphocytes only
- C** T-killer cells only
- D** B-lymphocytes and T-killer cells

126. Question | 9700 May-June 2022 P1 V2 Q38

38 Rabies is a viral disease which can be spread to humans by a bite from an infected animal.

One method of treatment is to inject the patient with antibodies specific to the rabies virus.

Which statements about this treatment are correct?

- 1 The patient will have natural passive immunity to rabies.
- 2 The injected antibodies will be broken down by the patient.
- 3 The patient's memory cells will be able to produce this antibody more rapidly in the future.
- 4 The immunity provided will only last a short time.

- A** 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

- 39** A person's blood group is determined by antigens present on the red blood cells. The table shows the antigens and antibodies in the blood of people with different blood groups.

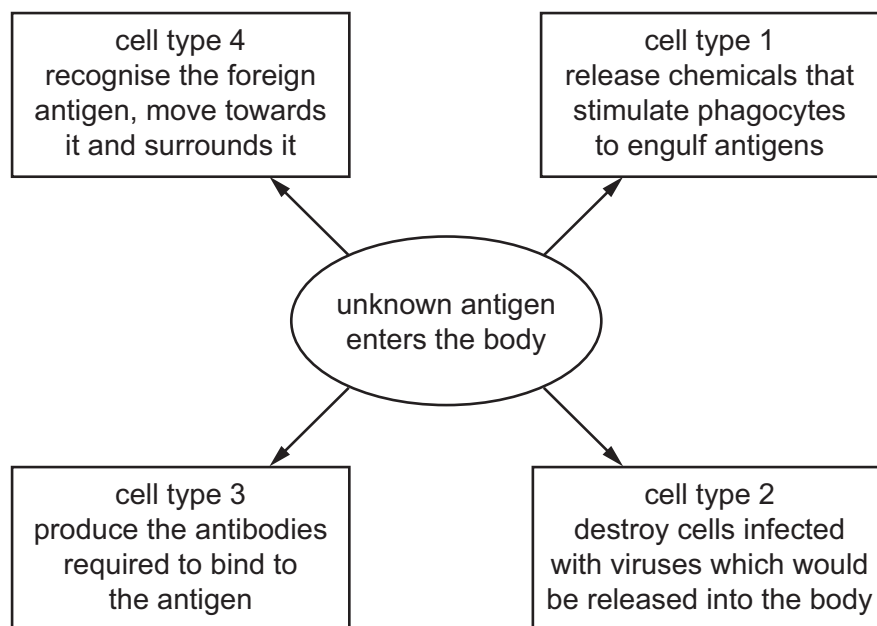
blood group	presence of A or B antigens on red blood cells	presence of antibodies to A or B in plasma
A	A only	anti-B only
B	B only	anti-A only
AB	A and B	neither
O	neither	anti-A and anti-B

During a blood transfusion, it is essential that the person who receives the blood does **not** have antibodies to the donor's blood.

Which blood groups can be given to a person with blood group B?

- A** A and B **B** AB and B **C** AB and O **D** B and O

40 A student used a diagram to show four types of cells involved in the primary immune response.



Which row is correct?

	cell 1	cell 2	cell 3	cell 4
A	B-lymphocyte	macrophage	T-killer cell	T-helper cell
B	macrophage	B-lymphocyte	T-helper cell	T-killer cell
C	T-helper cell	T-killer cell	B-lymphocyte	macrophage
D	T-killer cell	T-helper cell	B-lymphocyte	macrophage

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- 38** Rheumatoid arthritis is a disease which causes the body's immune system to attack its own cells. The disease can be treated using monoclonal antibodies.

The table shows how five different monoclonal antibodies can work.

monoclonal antibody	mode of action
1	binding to proteins on cell surfaces and triggering the immune system
2	blocking molecules on cell surfaces that inhibit T-lymphocytes
3	blocking cell signalling receptors that trigger cell division
4	binding to antigens on cell surfaces and releasing a drug
5	blocking cell signalling receptors that trigger the immune response

Inflammation and swelling of joints are symptoms of rheumatoid arthritis. The cytokine, TNFalpha, activates cells in the immune system leading to death of cells in the joint.

Which types of monoclonal antibody could be used to treat rheumatoid arthritis?

- A** 1, 2, 3, 4 and 5
- B** 1, 2, 3 and 4 only
- C** 2, 3 and 5 only
- D** 4 and 5 only

39 A person’s blood group is determined by antigens present on the red blood cells. Antibodies in the plasma of the person who receives the blood can make some blood transfusions unsafe.

The table shows the antigens and antibodies in the blood of people with different blood groups.

blood group	presence of A or B antigens on red blood cells	presence of antibodies to A or B in plasma
A	A only	anti-B only
B	B only	anti-A only
AB	A and B	neither
O	neither	anti-A and anti-B

Which blood groups can be given to a person with blood group A?

- A** A and AB **B** A and O **C** B and O **D** AB only

40 Some of the events during the primary immune response are listed.

- 1 phagocytosis of a foreign microbe by a macrophage and antigen presentation
- 2 some T-lymphocytes will become T-killer cells which kill infected body cells
- 3 the T-helper cell divides by mitosis to produce T-lymphocyte clones
- 4 a T-helper cell with the complementary receptor binds to the antigens being presented

What is the correct sequence of events during the primary immune response?

- A** 4 → 1 → 3 → 2
- B** 1 → 4 → 3 → 2
- C** 3 → 1 → 4 → 2
- D** 3 → 4 → 1 → 2

39 Which statements explain why some vaccines can be taken by mouth but tuberculosis (TB) vaccine has to be injected?

- 1 Macrophages present antigens in vaccines to stimulate an immune response.
- 2 The TB antigens necessary to produce an immune response are proteins which would be digested in the stomach and small intestine.
- 3 There are no B-lymphocytes and T-lymphocytes in the stomach.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 only

40 A student wrote the following statements about the production of monoclonal antibodies.

Which statement is **not** correct?

- A** Non-self antigen is injected into a mammal.
- B** Plasma cells secrete the specific antibody in response to a non-self antigen.
- C** Selected hybridoma cells divide by mitosis to form a clone.
- D** T-lymphocytes are fused with cancer cells to form hybridoma cells.

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39 Immunity to certain pathogens develops when a person is given a vaccination.

Which effects of vaccination are correct?

- 1 production of antibodies to protect against future infections
- 2 results in artificial active immunity
- 3 stimulation of appropriate lymphocytes

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

40 A student wrote three statements about antibodies.

- 1 Their structure depends on peptide, hydrogen and disulfide bonds.
- 2 They are protein molecules with both tertiary and quaternary structure.
- 3 Four polypeptides provide four antigen binding sites.

Which statements are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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39 Which statements explain the differences between a primary and a secondary response to exposure to the same antigen?

- 1 The primary response is slow, because there are only a few B-lymphocytes that are specific to the antigen.
- 2 The secondary response is faster, because there are many memory cells specific to the antigen.
- 3 More antibodies are produced during the secondary response, because many of the memory cells differentiate into plasma cells specific to the antigen.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

- 40** Which statement about B-lymphocytes **and** T-lymphocytes is correct?
- A** They become active only when a specific antibody binds to their surface receptor.
 - B** They divide to form clones when meeting an antitoxin in a cell.
 - C** They produce memory cells to respond to an antigen when exposed in the future.
 - D** They release hormone-like cytokines which stimulate release of antibodies.

- 40** Why is it difficult for B-lymphocytes and T-lymphocytes to respond to the antigens on pathogens that are intracellular parasites?
- A** The antigens are constantly mutating.
 - B** The antigens can destroy the lymphocytes.
 - C** The lymphocytes do **not** encounter the antigens.
 - D** The lymphocytes do **not** recognise the antigens.

139. Question | 9700 Feb-March 2023 P1 V2 Q40

40 Which processes characterise the mode of action of phagocytes?

- 1 antibody production
- 2 receptor binding
- 3 endocytosis
- 4 exocytosis
- 5 hydrolysis

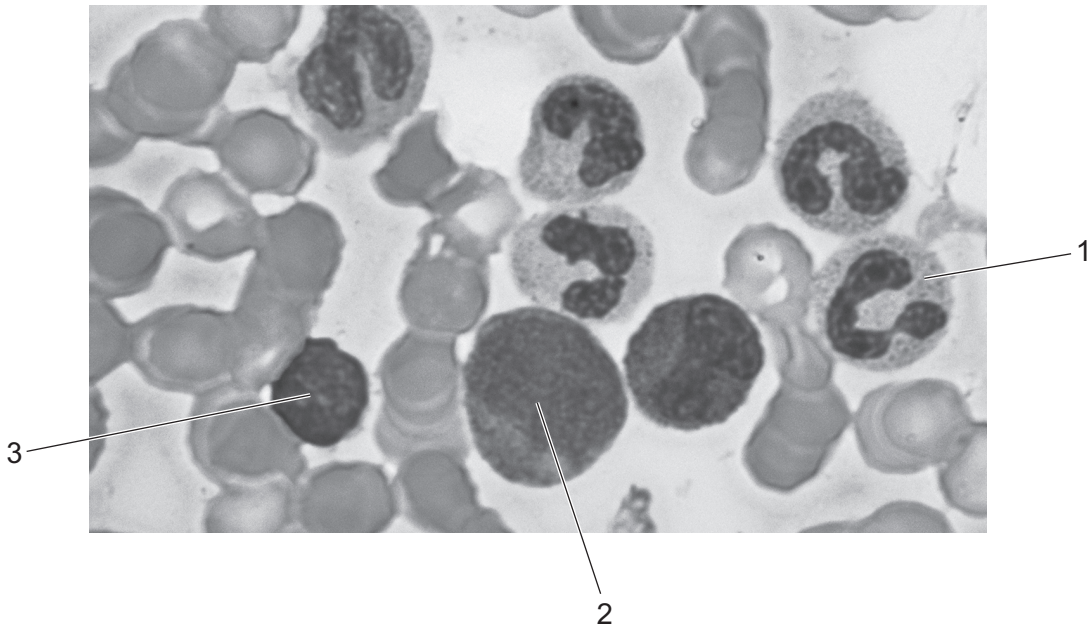
A 1, 2 and 4 **B** 1 and 4 only **C** 2, 3, 4 and 5 **D** 3 and 5 only

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28 The photomicrograph shows blood cells as seen using a high-power light microscope.



Which row correctly identifies the different types of white blood cell?

	1	2	3
A	lymphocyte	monocyte	neutrophil
B	monocyte	neutrophil	macrophage
C	neutrophil	monocyte	lymphocyte
D	phagocyte	lymphocyte	monocyte

141. Question | 9700 May-June 2023 P1 V1 Q39

39 Which blood cell type does **not** recognise, engulf and digest non-self particles?

- A** macrophages
- B** neutrophils
- C** phagocytes
- D** T-killer cells

40 Repeated infections with malaria result in more effective immunity to malaria.

Which type of immunity is responsible for the more effective immunity?

- A** artificial active
- B** artificial passive
- C** natural active
- D** natural passive

40 A successful vaccination programme provides a level of immunity where the majority of a population is protected.

There are several factors that can affect the success of a vaccination programme.

Which row correctly shows the factors that can affect the success of a vaccination programme?

	frequent mutation of the pathogen	vaccination from eight weeks old	pathogen is able to invade T-cells	booster vaccinations needed frequently
A	✓	✓	x	✓
B	✓	x	✓	✓
C	x	✓	✓	x
D	✓	x	✓	x

key

✓ = affects

x = does not affect

144. Question | 9700 May-June 2023 P1 V3 Q40

40 Monoclonal antibodies are produced using the hybridoma method.

What are removed from the spleen of a mouse to produce monoclonal antibodies?

- A** antigens
- B** clones
- C** lymphocytes
- D** myeloma cells

145. Question | 9700 Oct-Nov 2023 P1 V1 Q38

38 Some responses made by cells of the immune system to a pathogen are listed.

- 1 mitosis
- 2 bind to specific antigens
- 3 produce memory cells
- 4 secrete antibodies

Which responses are correct for B-lymphocytes?

- A** 1, 2, 3 and 4
- B** 1, 2 and 4 only
- C** 1 and 3 only
- D** 2, 3 and 4 only

146. Question | 9700 Oct-Nov 2023 P1 V1 Q39

39 Which statements about uses of monoclonal antibodies are correct?

- 1 Monoclonal antibodies can be injected into patients to give active immunity.
- 2 Monoclonal antibodies can be injected into patients to treat viral infections.
- 3 Monoclonal antibodies can be used as diagnostic tests for specific pathogens.

- A** 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 3 only

- 40** Which statement explains how a vaccination programme can control the spread of an infectious disease in a population?
- A** Unvaccinated individuals are less likely to meet a vaccinated individual.
 - B** Unvaccinated individuals are less likely to meet an infected individual.
 - C** Vaccinated individuals cannot catch the disease.
 - D** Vaccinated individuals have natural active immunity.

- 39** A patient with kidney failure can be given a kidney transplant. In a kidney transplant, a healthy kidney is taken from another person and put into the patient's body.

Sometimes the donated kidney cells are killed by the patient's body. In this primary immune response, T-lymphocytes bind to antigens on the donated kidney cells and are activated.

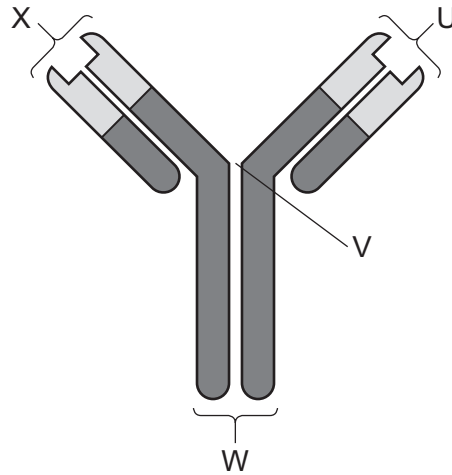
The statements describe the next stages of the primary immune response.

- 1 Activated T-lymphocyte secretes cytokines.
- 2 B-lymphocytes differentiate into plasma cells and make antibodies.
- 3 T-killer cells bind to antigens on donor kidney cells.
- 4 T-killer cells release toxins that destroy the donor kidney cells.
- 5 T-lymphocytes multiply by mitosis and differentiate into T-killer cells.

Which order correctly explains how donor kidney cells are killed?

- A** 1 → 5 → 2 → 3
- B** 1 → 5 → 3 → 4
- C** 3 → 1 → 5 → 2
- D** 3 → 5 → 4 → 1

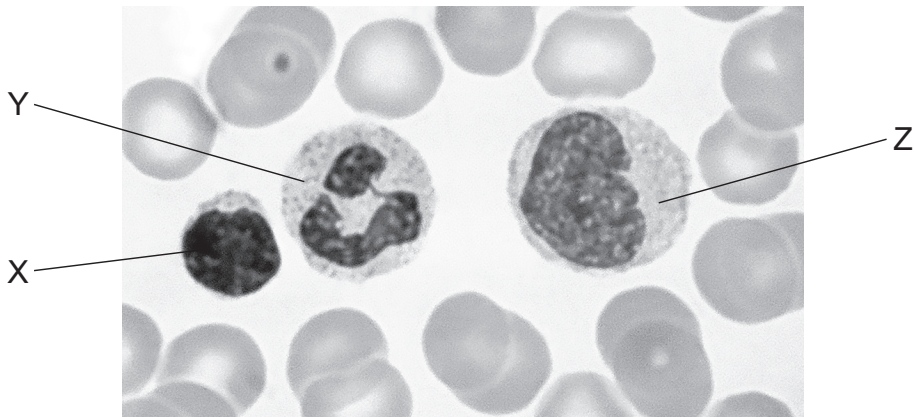
40 The diagram shows the simplified structure of an antibody.



Which statement is correct?

- A** U and X allow the antibody to bind to two different antigens.
- B** V allows the antibody to be flexible to bind to two antigens.
- C** W can bind to one specific antigen.
- D** X can bind with a specific phagocyte receptor.

29 The photomicrograph shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	monocyte	neutrophil
B	lymphocyte	neutrophil	monocyte
C	monocyte	neutrophil	lymphocyte
D	neutrophil	monocyte	lymphocyte

39 Some responses made by cells of the immune system to a pathogen are listed.

- 1 mitosis
- 2 recognises a pathogen
- 3 produces memory cells
- 4 secretes enzymes

Which responses are correct for phagocytes?

- A** 1, 2, 3 and 4
- B** 1, 2 and 3 only
- C** 1 and 3 only
- D** 2 and 4 only

- 40** Some vaccines do not contain antigens. The vaccines contain a molecule of mRNA. Cells in the immune system use the mRNA molecule to make a protein antigen.

The statements describe the stages of how mRNA vaccines work when they enter a cell of the immune system.

- 1 B-lymphocytes and T-lymphocytes with complementary receptors bind to the protein.
- 2 Lymphocytes differentiate into memory cells that give long lasting immunity.
- 3 Ribosomes translate the mRNA molecule to make a protein.
- 4 The cell displays the protein on its cell surface membrane.

What is the correct order of the stages of how mRNA vaccines work?

- A** 1 → 2 → 4 → 3
- B** 3 → 1 → 2 → 4
- C** 3 → 4 → 1 → 2
- D** 4 → 1 → 2 → 3

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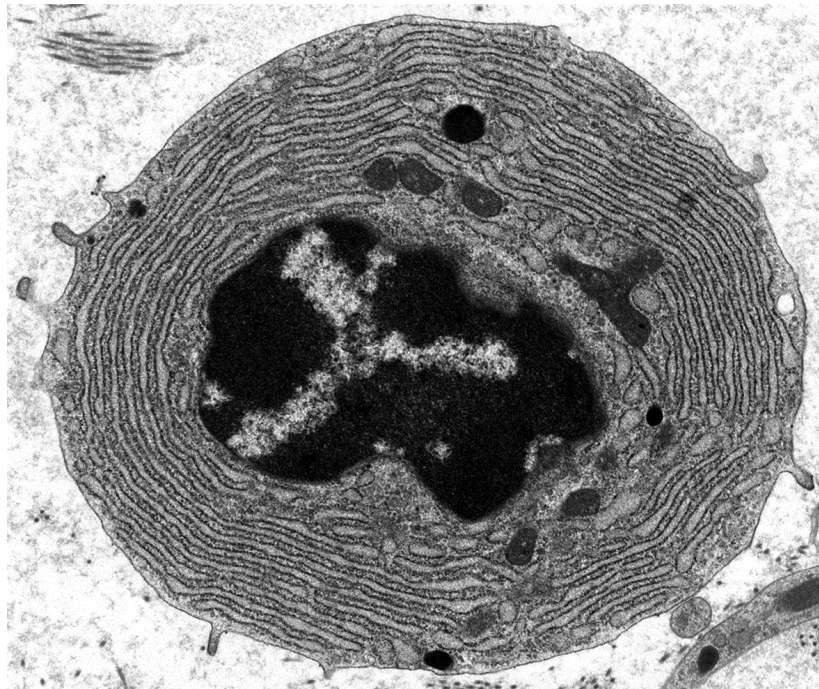
39 Monoclonal antibodies are now being used to treat some human diseases.

What explains why monoclonal antibodies are suitable for this purpose?

- 1 They can divide by mitosis to produce the large numbers of antibodies required for treatment.
- 2 They are specific to a particular antigen.
- 3 They can be modified so that they do **not** act as antigens themselves.

A 1, 2 and 3 **B** 1 only **C** 2 and 3 only **D** 2 only

38 The electron micrograph shows a type of blood cell.



What can be concluded from the electron micrograph?

- A** The cell secretes products that are toxic to pathogens.
- B** The cell synthesises a large quantity of proteins.
- C** The cell synthesises large quantities of antigens.
- D** The cell digests pathogenic bacteria.

39 Why is mitosis important in the immune response?

- A** It allows B-lymphocytes to produce plasma cells.
- B** It allows B-lymphocytes to synthesise antibodies.
- C** It allows neutrophils to carry out phagocytosis.
- D** It allows T-lymphocytes to recognise foreign antigens.

- 40** What is fused with a B-lymphocyte to form a hybridoma cell in monoclonal antibody production?
- A** antigen
 - B** clone
 - C** macrophage
 - D** myeloma cell

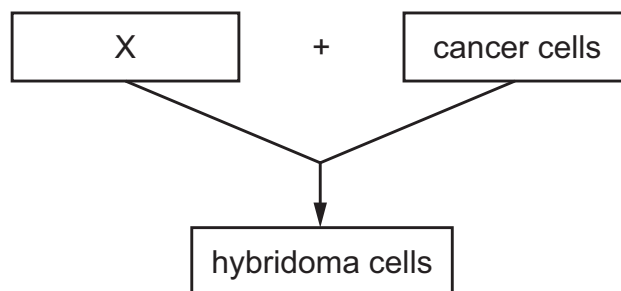
157. Question | 9700 May-June 2024 P1 V2 Q38

- 38** What is the correct sequence of events in a primary immune response?
- A** T-lymphocyte activation → B-lymphocyte selection → plasma cell release
 - B** antigen presentation by macrophages → cytokines released by T-helper cells → B-lymphocyte differentiation
 - C** antigen presentation by neutrophils → T-memory cell activation → B-lymphocyte selection
 - D** T-memory cell activation → B-memory cell activation → antibody production

158. Question | 9700 May-June 2024 P1 V2 Q39

- 39** Which statement about the properties of the antigen-binding sites in different antibody molecules is correct?
- A** They are located on the light chains only.
 - B** They have a hinge region to give flexibility for different antigens.
 - C** They have binding sites for receptors on phagocytes.
 - D** They have variable amino acid sequences for different antigens.

40 The diagram shows a stage in monoclonal antibody production.



What is represented by X?

- A** T-lymphocytes
- B** B-lymphocytes
- C** antigens
- D** antibodies

39 The events listed occur during the primary immune response to a specific pathogen.

- 1 activation of B-lymphocyte to produce plasma cells and memory cells
- 2 phagocytosis of invading pathogens by macrophages
- 3 T-helper cell activation and production of T-killer cells
- 4 expression of antigens on phagocyte cell surface
- 5 production and release of antibodies

Which row identifies a correct sequence of events?

	first  last				
A	5	1	2	4	3
B	2	4	3	1	5
C	4	2	1	5	3
D	4	2	3	1	5

39 What will be produced by the division of memory cells during a secondary immune response?

- A** macrophages
- B** plasma cells
- C** neutrophils
- D** monocytes

162. Question | 9700 Oct-Nov 2024 P1 V1 Q40

40 A vaccine is used to give immunity to the virus that causes the disease influenza.

A new influenza vaccine is needed every year because the virus mutates regularly.

What is the reason for needing a new influenza vaccine every year?

- A** Memory cells become less effective as they age.
- B** The primary immune response does **not** produce enough antibodies.
- C** The secondary immune response does **not** produce enough antibodies.
- D** The virus antigens change and are **not** recognised by the immune system.

163. Question | 9700 Oct-Nov 2024 P1 V2 Q36

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

Scientists are developing monoclonal antibodies that can be used to detect the presence of the toxin in the body so that early treatment can be given.

Which statements describe steps in the development of these monoclonal antibodies?

- 1 The toxin protein is injected into a mouse and triggers mitosis of specific B-lymphocytes.
- 2 Antibodies are collected from the spleen of the mouse and fused with myeloma cells.
- 3 A hybridoma cell produces many antibodies with a variety of different variable regions.

- A** 1 and 2 **B** 1 only **C** 2 and 3 **D** 3 only

164. Question | 9700 Oct-Nov 2024 P1 V2 Q38

38 Why is passive immunity effective for only a short time?

- A** Antibodies are rapidly broken down.
- B** Antigens are rapidly broken down.
- C** Memory cells soon die.
- D** Phagocytes soon die.

165. Question | 9700 Oct-Nov 2024 P1 V3 Q39

39 Which row is correct?

	involved in phagocytosis	secrete antibodies
A	T-lymphocytes	B-lymphocytes
B	T-lymphocytes	T-lymphocytes
C	B-lymphocytes	B-lymphocytes
D	B-lymphocytes	T-lymphocytes

166. Question | 9700 Oct-Nov 2024 P1 V3 Q40

40 Four steps that occur during the primary immune response to a pathogen are listed.

- P B-lymphocytes divide by mitosis.
- Q T-helper cells interact with macrophages that have digested pathogens.
- R Plasma cells secrete antibodies.
- S T-helper cells activate other lymphocytes.

These steps can be arranged in the sequence in which they occur.

Which step occurs third in the sequence?

- A P
- B Q
- C R
- D S

167. Question | 9700 Feb-March 2025 P1 V2 Q39

- 39** Specific monoclonal antibodies can be used to treat some forms of cancer. One example is trastuzumab, which can be used in the treatment of tumours caused by cancer.

Which statements could help to explain why monoclonal antibodies such as trastuzumab are suitable for this role?

- 1 The variable regions of monoclonal antibodies such as trastuzumab can change, allowing the antibodies to bind to cancer cells even if their antigens mutate.
- 2 Monoclonal antibodies such as trastuzumab bind to specific cell surface receptors on cancer cells, which prevents these receptors from receiving signals that are needed for cancer cells to grow and divide.
- 3 The antigen-binding sites of monoclonal antibodies such as trastuzumab are complementary to antigens found on some cancer cells, and have stable tertiary structures that do **not** change.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

168. Question | 9700 Feb-March 2025 P1 V2 Q40

- 40** The HIV virus causes illness by infecting and destroying T-helper cells. This leads to AIDS and an inability to produce an effective immune response.

Which components of the immune system are produced less effectively when AIDS develops?

- 1 memory cells
- 2 plasma cells
- 3 antibodies

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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169. Question | 9700 May-June 2025 P1 V1 Q37

37 Which statements explain why cholera has **not** been eradicated by vaccination?

- 1 There is limited availability of an affordable vaccine.
- 2 Protection takes several weeks to develop after vaccination.
- 3 The under-reporting of cholera in the community.
- 4 Immunity to cholera decreases after two years.

A 1, 2, 3 and 4 **B** 1 and 2 only **C** 2 and 4 only **D** 3 and 4 only

170. Question | 9700 May-June 2025 P1 V1 Q39

39 Tetanus is an infectious disease caused by a type of bacterium. This bacterium produces a protein that is a toxin which causes illness.

Scientists have produced a vaccine for tetanus which contains a harmless form of the toxin called a toxoid.

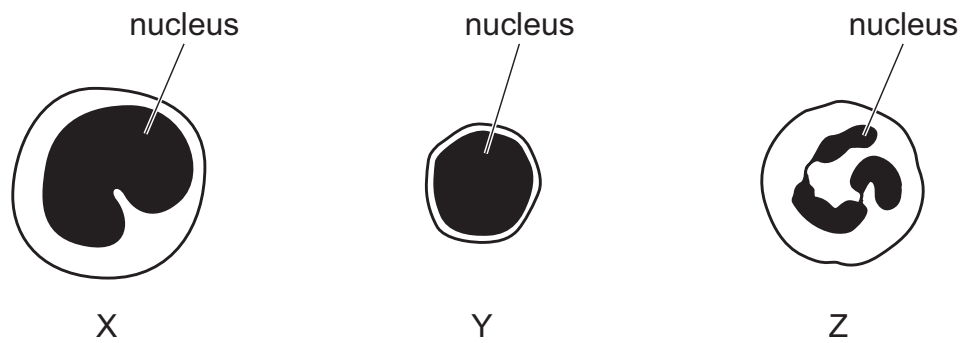
The toxoid is produced by mixing the toxin with the chemical formaldehyde. This chemical binds to the toxin making it harmless.

Which statement about the tetanus vaccine is correct?

- A** After vaccination, the toxoid in the vaccine will be ingested by neutrophils and displayed in their cell surface membranes.
- B** The tetanus vaccine containing the toxoid does **not** contain antigens because it does **not** contain any cells of the pathogen.
- C** The toxoid protein in the vaccine stimulates the production of antibodies which remain in the blood to provide long-term immunity.
- D** When formaldehyde binds to the toxin, it causes the toxin to completely change shape.

- 40** What is an effect on the immune system of a reduced number of T-helper cells?
- A** a decrease in the destruction of infected body cells by T-helper cells
 - B** a decrease in the activation of B-lymphocytes
 - C** an increase in the activation of T-killer cells
 - D** an increase in the production of plasma cells

31 The diagrams show three types of blood cells, which are all drawn to the same scale.



Which row shows the characteristics of the cells?

	name of blood cell X	engulfs pathogens by endocytosis	each responds to one antigen
A	monocyte	Y	Z
B	monocyte	Z	Y
C	lymphocyte	Y	Z
D	lymphocyte	Z	Y

39 The statements describe the phagocytosis of a bacterium by a macrophage.

- 1 Digestive enzymes break down the bacterium.
- 2 Lysosome fuses with the vacuole.
- 3 Macrophage displays the bacterial antigens on its cell surface membrane.
- 4 Macrophage engulfs the bacterium and encloses it in a vacuole.
- 5 Receptors on the cell surface membrane of macrophage bind to the bacterium.

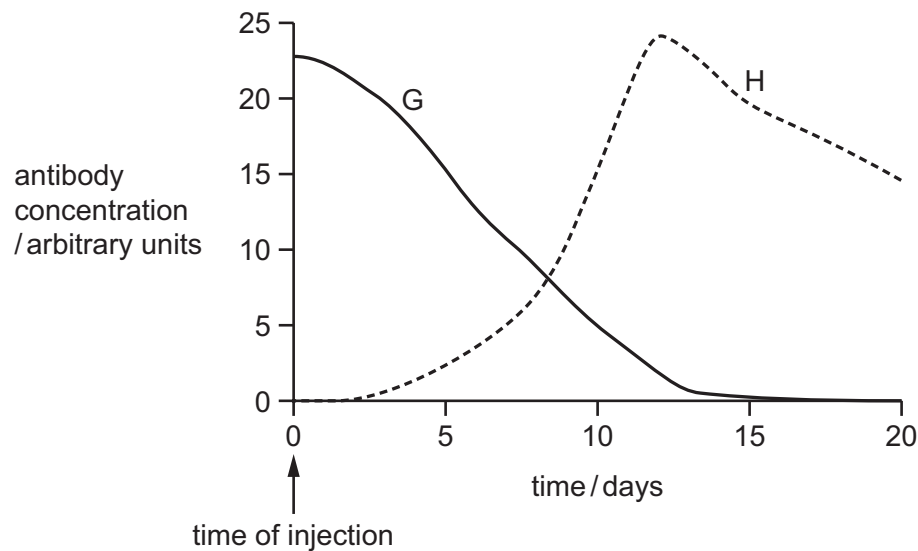
Which order is correct for phagocytosis?

- A** 3 → 5 → 4 → 1 → 2
- B** 4 → 2 → 1 → 5 → 3
- C** 5 → 4 → 2 → 1 → 3
- D** 5 → 4 → 3 → 1 → 2

40 Two people, G and H, were each given an injection to protect them against a particular pathogen.

One person was injected with antibodies. The other person was injected with a vaccine.

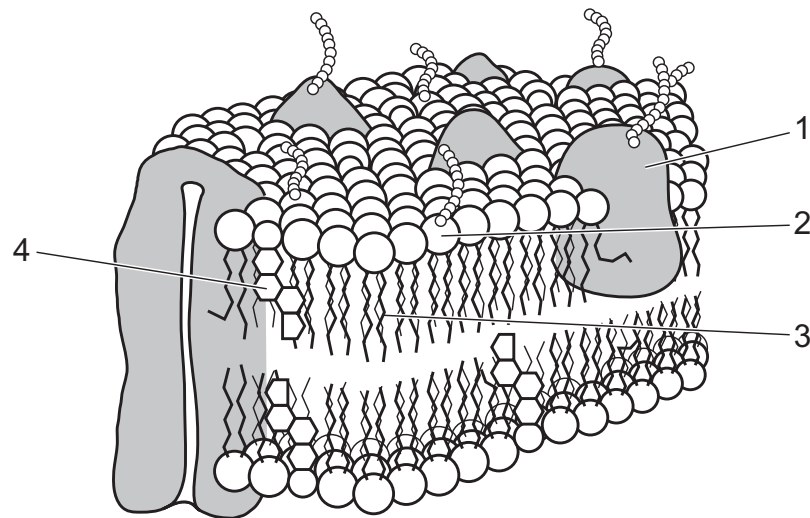
The graph shows the concentrations of the antibody against this pathogen in the blood of the two people, G and H, during a period of 20 days after their injections.



Which row correctly describes the type of immunity shown by G and H?

	G	H
A	artificial active immunity	artificial passive immunity
B	artificial passive immunity	artificial active immunity
C	natural active immunity	natural passive immunity
D	natural passive immunity	natural active immunity

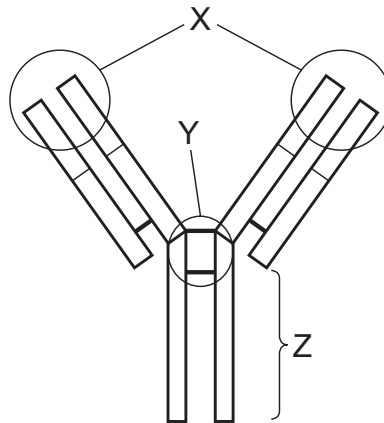
17 The diagram shows part of a eukaryotic cell surface membrane.



Which components act as antigens in cell surface membranes?

- A** 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 and 4

36 The diagram shows the structure of an antibody.



Which statements about the antibody are correct?

- 1 X has a similar shape to the antigen.
- 2 Y is the hinge region held by disulfide bonds.
- 3 Z is a constant region which binds to receptors on B-lymphocytes.

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 only

38 Some events that happen during phagocytosis are listed.

- 1 Molecules on the surface of a pathogen bind to the cell surface membrane of a phagocyte.
- 2 Endocytosis takes place forming a specialised vesicle.
- 3 Enzymes catalyse hydrolysis reactions.
- 4 Lysosomes migrate through the cytoplasm and fuse with an organelle.

What is the correct order of these events during phagocytosis?

- A** 1 → 2 → 4 → 3
B 1 → 4 → 2 → 3
C 3 → 2 → 4 → 1
D 3 → 4 → 2 → 1

178. Question | 9700 May-June 2025 P1 V3 Q39

39 What are the functions of plasma cells during an immune response?

- 1 to destroy cancer cells
- 2 to differentiate into memory cells
- 3 to secrete antibodies

A 1, 2 and 3 **B** 2 and 3 only **C** 2 only **D** 3 only

179. Question | 9700 May-June 2025 P1 V4 Q39

39 Which cells involved in the primary immune response are phagocytes?

- A** monocytes
- B** plasma cells
- C** T-helper cells
- D** T-killer cells

40 Some ways in which different types of monoclonal antibodies can work are described.

- 1 binding to proteins on cell surfaces and triggering the immune system
- 2 blocking molecules on cell surfaces that inhibit T-cells
- 3 blocking cell signalling receptors that trigger cell division
- 4 blocking cell signalling receptors that trigger the immune response

Which types of monoclonal antibody could be used to treat cancer?

- A** 1, 2, 3 and 4
- B** 1, 2 and 3 only
- C** 1 and 4 only
- D** 2, 3 and 4 only

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

Which two types of cell are used in this method?

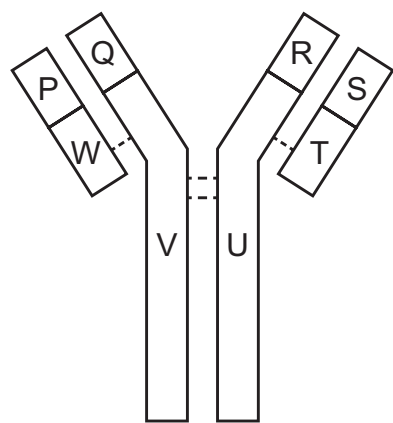
- A** stem cell and B-lymphocyte
- B** stem cell and T-lymphocyte
- C** tumour cell and B-lymphocyte
- D** tumour cell and T-lymphocyte

- 40** What describes a non-specific immune response?
- A** activation of killer T-lymphocytes by infected cells
 - B** cloning of B-lymphocytes to form plasma cells
 - C** ingestion of a bacterial cell by a neutrophil
 - D** recognition of antigens on the cell surface of macrophages

39 Which molecule could be a self antigen?

- A** a viral capsid protein
- B** a phospholipid in a viral envelope
- C** a toxin released by a pathogen
- D** a glycoprotein on the surface of a macrophage

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

186. Question | 9700 Oct-Nov 2025 P1 V3 Q40

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.

187. Question | 9700 Oct-Nov 2025 P1 V4 Q38

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.

188. Question | 9700 Oct-Nov 2025 P1 V4 Q39

- 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

189. Question | 9700 Oct-Nov 2025 P1 V4 Q40

- 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.