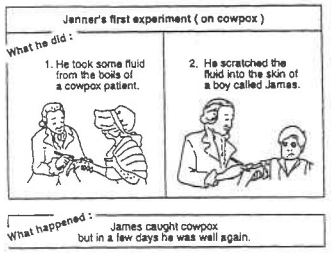
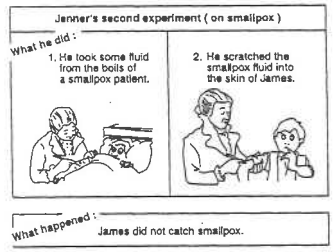
Past HKCEE Questions
Body Defence
Paper I

1. About 200 years ago, many people died of an infectious disease called smallpox. If a patient suffers from smallpox, a lot of small boils will appear on the skin. A British doctor, Edward Jenner, noticed that milkmaids often caught a similar but mild disease called cowpox. However, they never seemed to catch smallpox.
The following diagrams show two consecutive experiments performed by Jenner:





i. With reference to the first experiment, explain why James caught cowpox and in a few days he was well again. (4 marks)

ii. With reference to the second experiment, explain why James did not catch smallpox. (4 marks)

iii. At the end of the second experiment, would James become immune to other infectious disease? Why? (2 marks)
(HKCEE 1995)

2. Hepatitis B is a disease of the liver caused by a virus. Three members of a family, P, Q and R, took a blood test to find out if they are immune to this disease. The results of the blood test are shown in the table below:

	P	Q	R
Hepatitis B antigen in the blood	absent	absent	present
Level of antibody against hepatitis B in the blood (unit per dm^3)	0	297	0

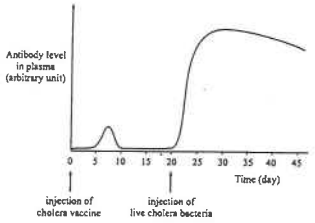
i.
(1) P was advised to have a hepatitis B vaccination. Explain how P could become immune against the disease after vaccination. (4 marks)

(2) Would this vaccination allow P to become immune to other types of hepatitis? Why? (2 marks)

ii. Both Q and R have not received any hepatitis B vaccination before. Suggest a reason to explain the difference in their blood test results. (2 marks)

iii. Hepatitis B is transmitted through contact with the body fluid of an infected person. Apart from vaccination, suggest two measures that can prevent the transmission of this disease. (2 marks)
(HKCEE 1998)

3. Cholera is a human disease caused by a type of bacteria. It is transmitted through contaminated water and food. A vaccine against this disease is made up of killed cholera bacteria. To study the effectiveness of the vaccine, a mouse was first injected with the vaccine and then with live cholera bacteria 20 days later. During the study, the mouse showed no sign of cholera. The changes in the antibody level in the plasma of the mouse are shown in the graph below:



(i) Explain the rise in the antibody level between day 5 and day 7. (2 marks)

(ii) State two differences between the patterns of

(iii) People may be infected with cholera through eating contaminated seafood. Besides vaccination, suggest *two* ways to reduce the risk of cholera infection through eating seafood. (2 marks)
(HKCEE 2003)

Past HKCEE Questions
Body Defence
Paper II

90-37.
The following table shows the results of a test to match the blood groups of three persons P, Q and R for blood transfusion:

		Donor		
		P	Q	R
Recipient	P		X	√
	Q	√		√
	R	X	X	

Key : √ = blood can be transfused without ill-effect
X = blood cannot be transfused

The blood groups of Q and R must be

	Q	R
A.	AB	O
B.	O	AB
C.	A	B
D.	O	A

91-28.
Which of the following blood transfusions causes harm to the recipient?

	Donor's blood group	Recipient's blood group
A.	A	AB
B.	AB	B
C.	O	AB
D.	O	A

92-35.
Two samples of human blood were mixed. Observation under the microscope showed no clumping of blood cell. Which of the following is the best conclusion?

A. The samples were of blood group O.
B. The samples were of blood group AB.
C. Tire simples were of the same blood group.
D. The samples were of different blood groups.

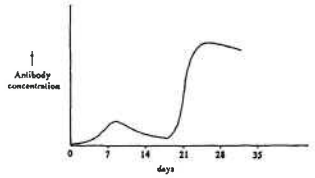
93-28.
Dianna belongs to blond group A and her brother John belongs to blood group B. Their father can receive a blood donation from John only and their mother can donate blood to Dianna only. To which blood groups do their parents belong?

	Father	Mother
A.	B	A
B.	A	O
C.	AB	B
D.	O	AB

94-13.
Cindy can only receive blood of group B and group O in a blood transfusion. Her blood group is

A. A.
B. B.
C. AB.
D. O.

94.
Directions: Questions 48 and 49 refer to the graph below which shows the changes; in the concentration of antibodies in the blood of a person with time:



94-48.
The increase in the antibody concentration on day 7 might be caused by

A. excessive bleeding.
B. the entry of bacteria.
C. recovery from a disease.
D. the intake of a large amount of antibiotics.

94-49.
The antibody concentration increased rapidly on day 21 because the person

A. developed a fever.
B. received a vaccination.
C. was infected by the same type of antigen:
D. produced a large number of phagocytes,

96-30.
The table below summarizes the compatibility for blood transfusion among three persons

		Recipient		
		Mary	John	David
Donor	Mary		X	✓
	John	X		✓
	David	X	X	

Key : ✓ = blood can be transfused with no ill effects
X = blood should not be transfused

If the blood group of Mary is A, what are the blood groups of the others?

	John	David
A.	O	A
B.	O	AB
C.	B	A
D.	B	AB

97-32.
Which of the following components of the blood can destroy bacteria that have entered the body?

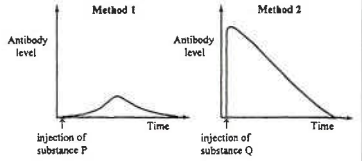
(1) antibodies
(2) phagocytes
(3) blood platelets

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1). (2) and (3)

99-40
Which of the following statements about antibodies is ***incorrect***?
A. They are proteins.
B. They can kill bacteria.
C. They are specific in action.
D. They have a memory of the bacteria.

99-46
Which of the following are examples of artificial immunity?
(1) injection of vaccine into the body
(2)injection of antibodies into the body
(3) injection of antibiotics into the body
A. (1) only
B. (1) and (2) only
C. (2) and (3) only
D. (1), (2) and (3)

00.
Directions: Questions 49 and 50 refer to the graphs below, which show the changes in the antibody level in the blood as a result of two methods of inducing immunity in humans:



00-49
Substance P can be
(1) bacteria.
(2) antigens.
(3) antibodies.
A. (1) only
B. (3) only
C. (1) and (2) only
D. (2) and (3) only

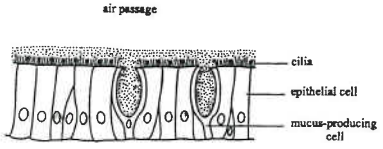
00-50
What is the advantage of method 2 over method 1 in inducing immunity?
A. The immunity can last longer.
B. The immunity can develop faster.
C. It can stimulate the white blood cells to produce more antibodies.
D. The body can become immune against a wider range of diseases.

01-18
Which of the following statements about antibodies is correct?
A. They act on specific antigens.
B. They are produced by phagocytes.
C. They can develop a memory for antigens.

01-57
A person's blood takes a long time to clot. This may be due to a diet lacking in
A. iron.
B. calcium.
C. vitamin A.
D. vitamin C.

01-60
Which of the following structures produce secretions that can protect the body from infection?
(1) skin .
(2) stomach
(3) trachea
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

02.
Directions: Questions 26 and 27 refer to the diagram below, which shows a section of the inner lining of the human respiratory tract



02-26
This section is most probably taken from
A. the nostril.
B. the pharynx.
C. the bronchus.
D. the air sac.

02-27
What features of the inner lining help in protecting the body against bacterial infection?
(1) beating of cilia
(2) presence of mucus
(3) close packing of the epithelial cells
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

02-41
The table below shows the compatibility for blood transfusion of two persons:

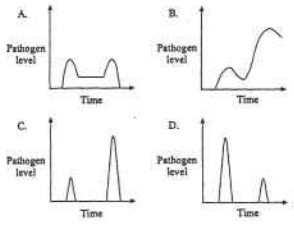
		Blood group of donor	
		A	B
Recipient	Peter	×	×
	Mary	✓	✓

Key: ✓ = blood can be transfused with no ill effects
× = blood should not be transfused

Which of the following combinations correctly shows the compatibility for blood transfusion between Peter and Mary?

	Peter donating blood to Mary	Mary donating blood to Peter
A.	✓	✓
B.	X	X
C.	✓	X
D.	X	✓

02-42
A person was infected by the same kind of pathogen twice within a month.
Assuming the quantity of pathogen for both infections was the same, which of the following graphs correctly shows the change in the pathogen level in the person's blood?



04-56
Which of the following statements about antibodies is correct?
A. Injection of antibodies can provide immunity against certain infectious diseases.
B. Antibodies against a particular antigen can act on a wide range of pathogens.
C. Antibodies can develop a memory for pathogens.
D. Antibodies can be reused.

05-12
Mary, of blood group A, and her husband, of blood group 0, have two children. Both children are found to have blood group A. Mary concludes that she must be homozygous for blood group A. Given that blood group A is dominant to blood group 0, is Mary's conclusion correct?
A. Yes, because each of Mary's children has inherited at least one allele for blood group A from her.
B. Yes, because if Mary is heterozygous, one child should be of blood group A and the other should be of group O.
C. No, because both children can be of blood group A even if Mary is heterozygous.
D. No, because there are other blood groups besides blood groups A and O.

06-12
Which of the following acts as a chemical barrier for preventing the entry of pathogens into the body?
A. bile released from the gall bladder
B. saliva secreted from the salivary glands
C. blood clot formed on the wounds of the skin
D. mucus secreted from the epithelial cells of the trachea

06-53
When there is a cut on the skin, the area around the wound will become red and swollen. The wounded area
A. gets red because the capillaries under the skin undergo vasodilation.
B. swells because phagocytes produce antibodies.
C. swells because tissue fluid accumulates.
D. gets red because the body temperature increases.

07-25
Which of the following diseases can be transmitted by mosquitoes?
(1) Avian flu (禽流感)
(2) Dengue fever(登革熱)
(3) Japanese encephalitis(日本腦炎)
A. (1) and (2) only
B. (1) and **(3) only**
C. (2) and (3) only
D. (1), (2) and (3)

07
Directions: Questions 56 and 57 refer to the table below, which shows the results of a blood test of three individuals. None of them have received any vaccinations related to hepatitis A before.

	Level of hepatitis A antigen in blood (arbitrary unit)	Level of antibody against hepatitis A antigen in blood (arbitrary unit)
X	0	0
Y	0	297
Z	500	351

07-56
Which individuals have contracted hepatitis A?
A. X and Y only
B. X and Z only
C. Y and Z only
D. X, Y and Z

07-57
Vaccination can confer protective effect to individual(s)
A. X only.
B. Z only.
C. X and Y only.
D. Y and Z only.

Past HKCEE Questions
Body Defence
Suggested Answer

Paper I

1. (i) The fluid in the boils contains the cowpox virus / pathogen / germ which cannot be killed by the body on its first exposure to the pathogen 1
The virus multiplies / damages body cells, so James became ill. 1
After a few days s sufficient antibodies / phagocytes (white blood cells) are produced to kill the pathogen , so James got well again. 1
Communication Skill (c) 1

(ii) The previous exposure to the cowpox antigen was 'memorized' by certain white blood cells 1
The pathogens / antigens of smallpox and cowpox are similar 1
It can stimulate the production of a lot of antibodies / phagocytes in a short time and kill the smallpox virus. 1

(iii) No 1
Because his immunity is specific to the antigen /pathogen 1
OR
because antibodies are specific in action

2. (i) (1) The vaccine contains the hepatitis B antigen 1
which stimulates certain white blood cells 1
to develop a memory for the antigen. 1
If P is exposed to the hepatitis B virus, large amount of specific antibodies will be produced in a short time so as to destroy the virus 1
Communication Skill (c) 1
(2) No 1
because the memory developed in the white blood cells is specific to the hepatitis B virus only 1

(ii) Both Q and R contacted the hepatitis B virus before 1
but only Q can form antibodies to destroy the virus while R cannot/has not yet produced antibodies 1

(iii) Wear gloves when handling wounds
Do not share toothbrush / nail cutter / razor etc. 1
Use condom during sexual intercourse +
Screen the blood used in blood transfusion 1
(any 2)

3. (i) The antigen in the cholera vaccine 1
stimulates specific white blood cells 1
to produce antibody, resulting in the rise in antibody level.

(ii) (Any 2 points below:) 2
- For the second injection, the rise in antibody level occurs earlier,
- the rise in antibody level is faster,
- and the peak of the antibody level is higher.

This is because as a result of the first injection, certain white blood cells will develop a memory for the antigen. 1
When the same antigen enters the body in the second injection, the white blood cells will produce a large amount of antibodies 1
within a short time. 1

(iii) Cook the seafood thoroughly. 1
Irradiate seawater used in fish tanks with UV light. 1
(or other reasonable answers)

Paper II

90-37	A
91-28	B
92-35	C
93-28	A
94-13	B
94-48	B
94-49	C
96-30	D
97-32	A
99-40	D
99-46	DELETED
00-49	C
00-50	B
01-18	A
01-57	DELETED
01-60	D

02-26	C
02-27	D
02-41	C
02-42	D
04-56	A
05-12	C
06-12	B
07-25	C
07-56	C
07-57	A