## **Immunity questions**



**3 a) i)** Name **one** disease caused by bacteria. (1 mark)

The diagram shows how a blood cell called a phagocyte deals with an invading bacterium.



- **ii)** What type of blood cell is a phagocyte? *(1 mark)*
- iii) Describe what is happening at stages 2 and 3. (2 marks)

b) Another way of dealing with invading bacteria that cause disease is to produce antibodies. The diagram shows the sequence of events following the production of antibodies.



- What is present on the outside of the bacterium that causes the antibodies to be produced? (1 mark)
- **ii)** Use the diagram and your knowledge to explain why the antibodies shown in this diagram would not protect a person from invasion by a different bacterium. *(1 mark)*
- iii) Suggest why someone is unlikely to get the same disease again, once they have produced antibodies against a particular type of bacteria. (2 marks)

**4 a)** Describe how the mucous membranes in the nasal cavity (nose) protect against disease.

(2 marks)

b) The diagram below shows how the antibody level in the body changed after a vaccination. It also shows that immunity was not achieved.



i) Suggest **one** thing that should have been done to ensure that enough antibodies were produced to achieve immunity.

(1 mark)

- **ii)** Describe and explain how a vaccination works. *(3 marks)*
- c) Explain why someone travelling to Africa for the first time may be given travel vaccinations before they go. (2 marks)

**b)** A doctor was asked at short notice to travel abroad to help rescue survivors of an carthquake.

To protect him against a disease, he was given an injection that provided him with artificial, passive immunity.

The table shows the level of antibodies in his blood over the next 15 weeks.

Time since injection/ weeks	Level of antibodies in blood/arbitrary units
0	0
	20
3	18
5	16
7	13
9	9
	5
3	2
15	0

Use evidence from the table to help explain artificial, passive immunity. *(4 marks)* 

 c) Explain how the antibodies in the injection and phagocytes in the doctor's blood would protect him if he was infected by the disease microorganism. (4 marks)

The minimum level of antibodies in the blood that protect against the disease is 14.5 arbitrary units.

- d) i) How long would it be safe for the doctor to stay abroad? (1 mark)
  - **ii)** Explain why the doctor should return home before this time. (1 mark)

# **Immunity answers**

3 a) i) Name one disease caused by bacteria.

(1 mark)

The diagram shows how a blood cell called a phagocyte deals with an invading bacterium.



- **ii)** What type of blood cell is a phagocyte? *(1 mark)*
- iii) Describe what is happening at stages 2 and 3. (2 marks)

3 a) i) *Salmonella*, Gonorrhoea, *Pseudomonas syringae* 

ii) White blood cell

iii) Engulfing then using enzymes to digest the bacterium b) Another way of dealing with invading bacteria that cause disease is to produce antibodies. The diagram shows the sequence of events following the production of antibodies.



- i) What is present on the outside of the bacterium that causes the antibodies to be produced? (1 mark)
- **ii)** Use the diagram and your knowledge to explain why the antibodies shown in this diagram would not protect a person from invasion by a different bacterium. *(1 mark)*
- iii) Suggest why someone is unlikely to get the same disease again, once they have produced antibodies against a particular type of bacteria. (2 marks)

### b) i) Antigens

ii) The different bacterium would have different antigens on its surface, which these antibodies would not be complementary to

iii) Memory lymphocytes are created which can make the antibodies quickly if infected again, so no symptoms are seen (this is the secondary response) **4 a)** Describe how the mucous membranes in the nasal cavity (nose) protect against disease.

(2 marks)

b) The diagram below shows how the antibody level in the body changed after a vaccination. It also shows that immunity was not achieved.



4 a) mucous traps dirt/dust containing microbes, and cilia move this to the throat so it can be swallowed and microbes destroyed in stomach acid

b) i) A second
vaccination/booster
vaccination or stronger
dose

i) Suggest **one** thing that should have been done to ensure that enough antibodies were produced to achieve immunity.

(1 mark)



ii) Describe and explain how a vaccination works. (3 marks)

ii) - In active immunity, a person is injected with antigens or weakened/dead form of pathogen -Their immune system makes antibodies and memory lymphocytes to match the antigens -Upon secondary infection the disease is quickly defeated -In passive immunity antibodies are injected (no memory cells made)



c) – Different pathogens are present in Africa that they would not be protected against (through active or passive immunity). This immunity must be created before they leave in order to avoid sickness.

 c) Explain why someone travelling to Africa for the first time may be given travel vaccinations before they go. (2 marks) **b)** A doctor was asked at short notice to travel abroad to help rescue survivors of an earthquake.

To protect him against a disease, he was given an injection that provided him with artificial, passive immunity.

The table shows the level of antibodies in his blood over the next 15 weeks.

Time since injection/ weeks	Level of antibodies in blood/arbitrary units
0	0
	20
3	18
5	16
7	3
9	9
	5
3	2
15	0

Use evidence from the table to help explain artificial, passive immunity. (4 marks)

#### 5 b)

-After 1 week there is a high level of antibodies -This decreases as the weeks go on -No memory lymphocytes had been created -By week 15 no antibodies were left -Body didn't create any antibodies itself -This was short lived protection

**b)** A doctor was asked at short notice to travel abroad to help rescue survivors of an earthquake.

To protect him against a disease, he was given an injection that provided him with artificial, passive immunity.

The table shows the level of antibodies in his blood over the next 15 weeks.

Time since injection/ weeks	Level of antibodies in blood/arbitrary units
0	0
	20
3	18
5	6
7	3
9	9
	5
3	2
15	0

c) The antibodies would match the antigens on the microorganism and destroy it. They would clump the microorganisms together and a phagocyte would engulf and digest the pathogen

 c) Explain how the antibodies in the injection and phagocytes in the doctor's blood would protect him if he was infected by the disease microorganism. (4 marks)

Time since injection/ weeks	Level of antibodies in blood/arbitrary units
0	0
	20
3	18
5	6
7	3
9	9
	5
3	2
15	0

#### d i) 5 weeks

ii) He would not be protected after this point and would develop the disease if he caught that microorganism

The minimum level of antibodies in the blood that protect against the disease is 14.5 arbitrary units.

- d) i) How long would it be safe for the doctor to stay abroad? (1 mark)
  - **ii)** Explain why the doctor should return home before this time. (1 mark)