1 The MMR vaccine is used to protect children against measles, mumps and rubella.

(a) Complete the sentences about vaccination.

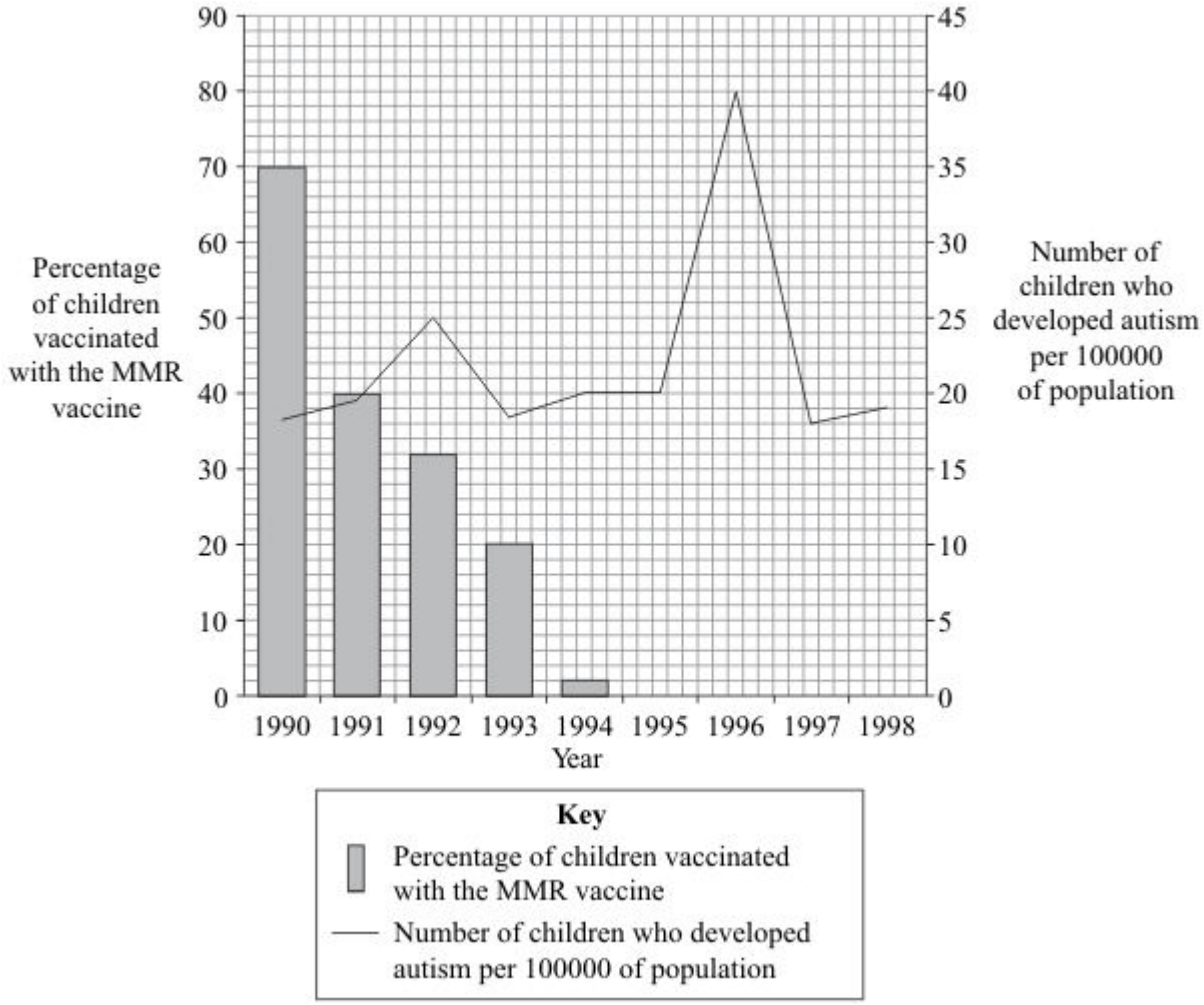
Vaccines stimulate white blood cells to produce ..... .

This makes children ..... to the pathogen.

(2)

(b) In the 1990s, many people thought that the MMR vaccine caused autism in some children. As a result, the Japanese government stopped using the MMR vaccine.

The graph gives information about the percentage of children in Japan vaccinated with the MMR vaccine and the number of children who developed autism during the 1990s.



(i) Describe how the percentage of children vaccinated with the MMR vaccine changed between 1990 and 1995.

.....

.....

.....

.....

.....

(2)

(ii) Does the data in the graph support a link between MMR vaccination and autism?

Draw a ring around your answer. **Yes** / **No**

Explain the reason for your answer.

.....

.....

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.....

(2)

(Total 6 marks)

2 Some students investigated the effect of pH on the growth of one species of bacterium.

They transferred samples of bacteria from a culture of this species to each of eight flasks. Each flask contained a solution of nutrients but at a different pH.

After 24 hours, the students measured the amount of bacterial growth.

(a) It was important that the flasks in which the bacteria grew were not contaminated with other microorganisms.

Describe **two** precautions the students should have taken to prevent this contamination.

1 .....

.....

2 .....

.....

(2)

(b) To see the effect of pH on the growth of the bacteria, other conditions should be kept constant.

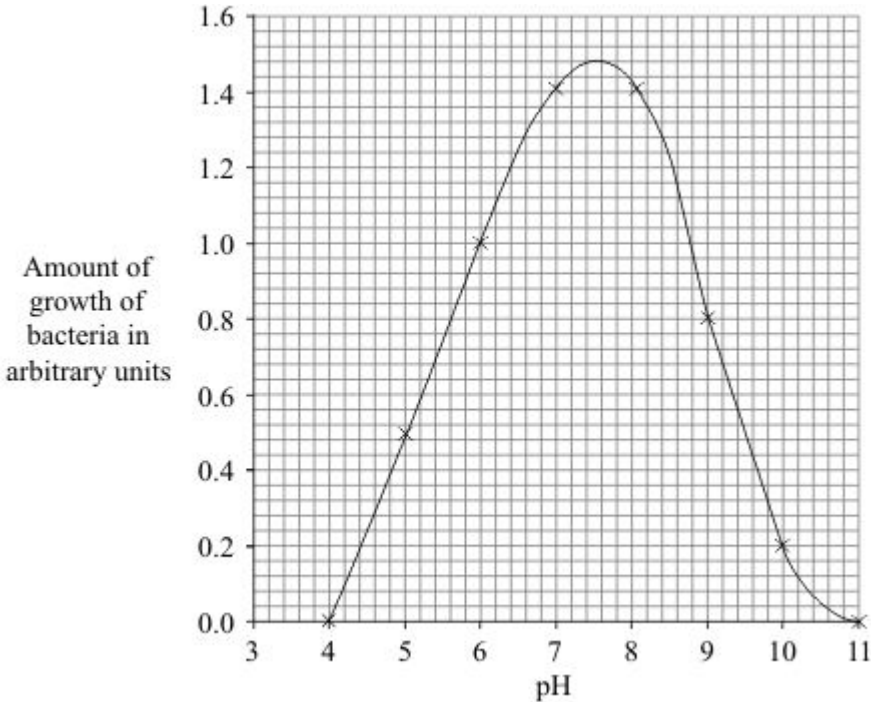
Suggest **two** conditions which should have been kept constant for all eight flasks.

1 .....

2 .....

(2)

(c) The graph shows the results of the investigation.



The students wanted to find the best pH for the growth of this species of bacterium.

(i) Use the graph to estimate the pH at which the bacteria would grow best.

pH .....

(1)

(ii) What could the students do to find a more accurate value for the best pH for growth of the bacteria?

.....

.....

(1)

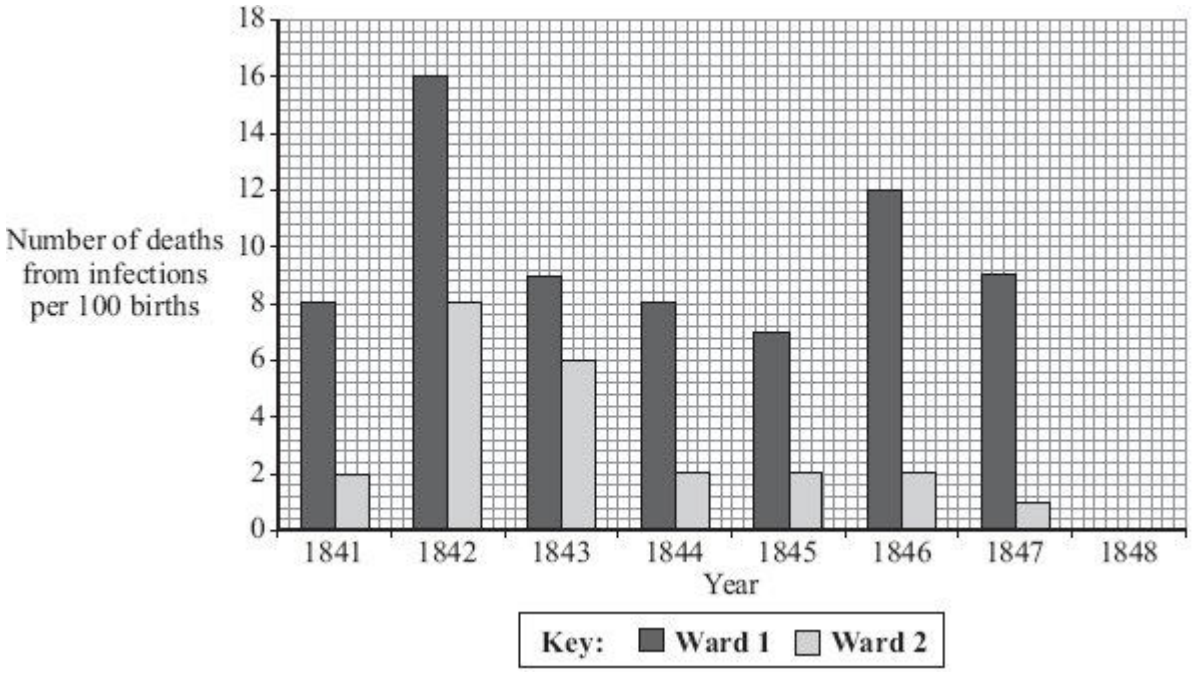
(Total 6 marks)

3 In the 19th century, Dr Semmelweiss investigated infection in a hospital.

He compared the number of deaths of mothers on two maternity wards.

- On **Ward 1**, babies were delivered mainly by doctors. These doctors worked on many different wards in the hospital.
- On **Ward 2**, babies were delivered by midwives. The midwives did **not** work on other wards.

The bar chart shows the results of his investigations.



(a) (i) 600 mothers gave birth on **Ward 2** in 1845.

How many mothers died from infections on **Ward 2** in 1845?

Show clearly how you work out your answer.

.....

.....

Number of mothers who died .....

(2)

(ii) Which was the safer ward on which to have a baby?

Draw a ring around your answer. **Ward 1** / **Ward 2**.

Using data from the bar chart, give a reason for your answer.

.....

.....

(1)

(b) In January 1848, Dr Semmelweiss asked all doctors to wash their hands before delivering babies.

The table shows the number of deaths on the two wards in 1848.

Ward	Number of deaths from infections per 100 births
Ward 1	3
Ward 2	1

(i) Plot this data on the bar chart above.

(1)

(ii) What was the effect on the death rate on **Ward 1** of doctors washing their hands before delivering babies?

.....

.....

(1)

(iii) Suggest an explanation for this effect.

.....

.....

(1)

(Total 6 marks)

4 Influenza is a disease caused by a virus.

(a) Explain why it is difficult to treat diseases caused by viruses.

.....

.....

.....

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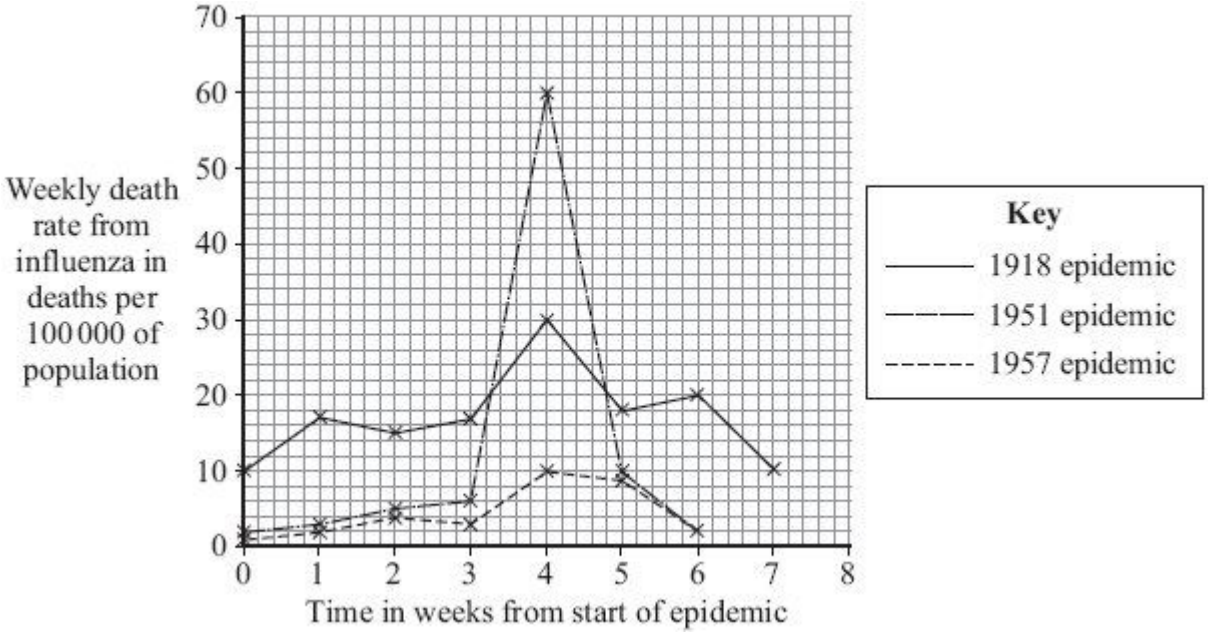
(2)

(b) In some years there are influenza epidemics.

The graph shows the death rate in Liverpool during three influenza epidemics.



(i) The population of Liverpool in 1951 was approximately 700 000.

Calculate the approximate number of deaths from influenza in week 4 of the 1951 epidemic.

Show clearly how you work out your answer.

.....

.....

Number of deaths .....

(2)

(ii) In most years, the number of deaths from influenza in Liverpool is very low.

Explain, in terms of the influenza virus and the body's immune system, why there were large numbers of deaths in years such as 1918 and 1951.

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.....

(3)
(Total 7 marks)

5 (a) Microorganisms can be grown on agar jelly in a Petri dish.

List A gives three actions used when growing microorganisms.
List B gives four possible effects of these actions.

Draw a straight line from each action in **List A** to its effect in **List B**.

List A – Action	List B – Effect
The agar jelly is heated at 120 °C for 30 minutes	To reduce the growth of pathogens
Make sure the temperature for growing the microorganisms is no higher than 25 °C	To kill unwanted microorganisms
The lid of the Petri dish is held on with tape	To prevent microorganisms from the air getting into the Petri dish
	To prevent oxygen entering the Petri dish

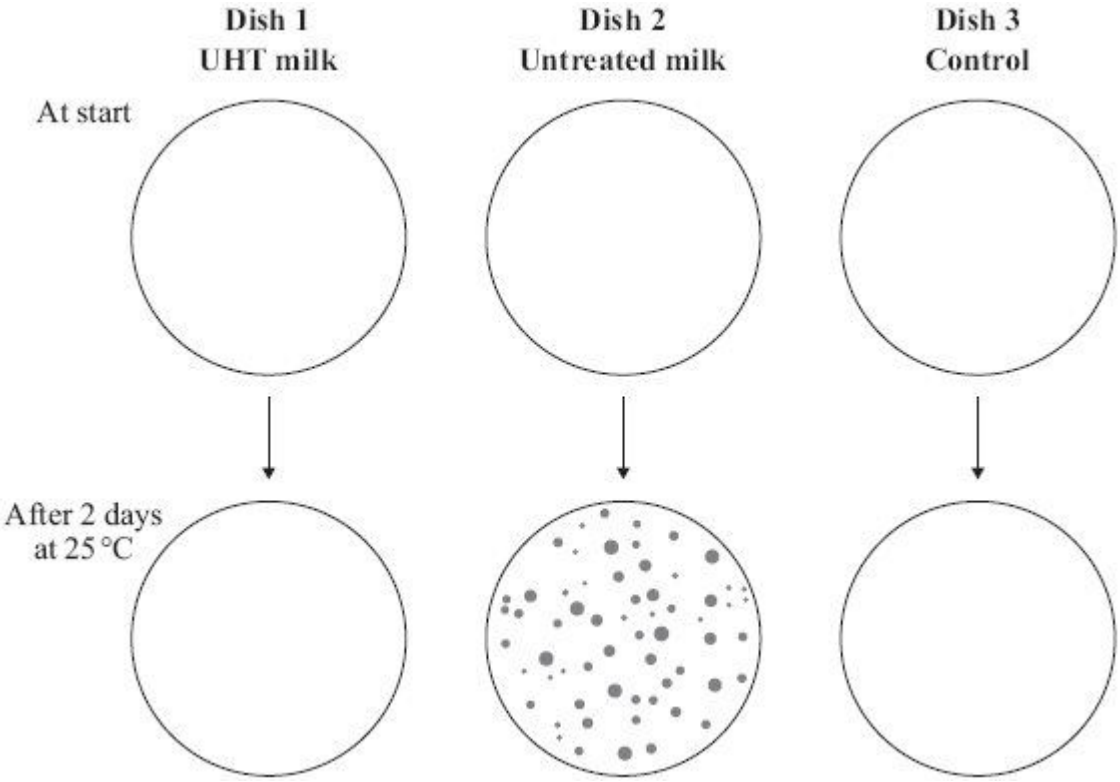
(3)

(b) UHT milk is milk that has been heated to 135 °C, then cooled.

In an investigation, three sterile Petri dishes containing sterile agar jelly were set up as follows.

- UHT milk was added to dish **1**.
- Untreated milk was added to dish **2**.
- Dish **3** was left unopened as a control.
- The dishes were kept at 25 °C for two days.

The results are shown in the diagram below.



(i) Describe the difference in appearance between dishes **1** and **2** after two days.

.....

.....

(1)

(ii) Give **one** reason for this difference.

.....

.....

(1)

(iii) There was no change in the appearance of dish **3** after two days.

Give **one** reason why.

.....

.....

(1)

(Total 6 marks)

6 Polio is a disease caused by a virus. In the UK, children are given polio vaccine to protect them against the disease.

(a) In the sentences below, draw a ring around the correct words in each box.

(i) It is difficult to kill the polio virus inside the body

because the virus	is not affected by drugs lives inside cells produces antitoxins	

(1)

(ii) The vaccine contains an

	active infective inactive	form of the polio virus.

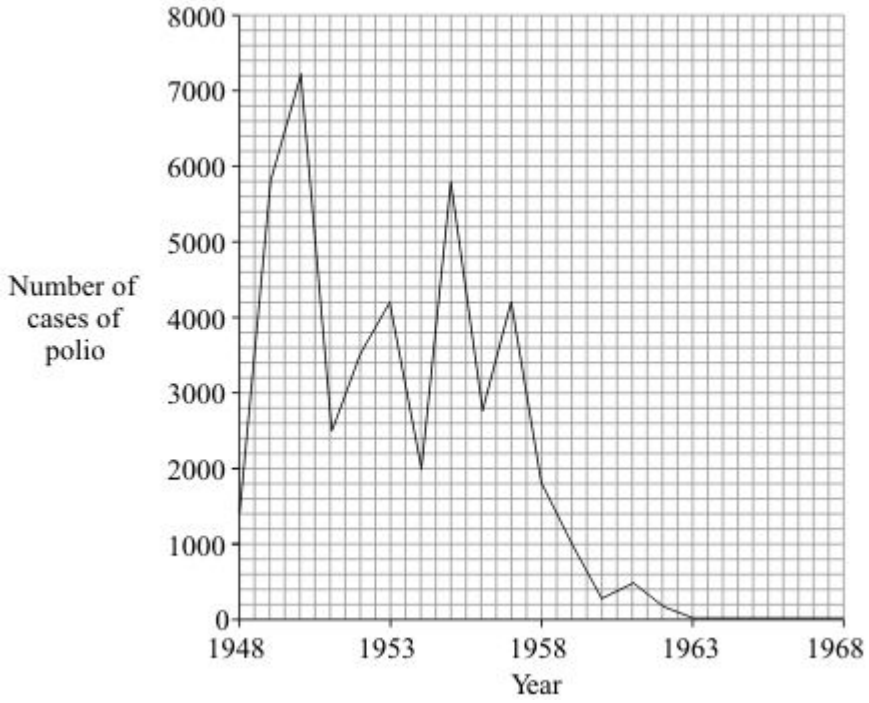
(1)

(iii) The vaccine stimulates the white blood cells to

produce	antibiotics antibodies drugs	which destroy the virus.

(1)

(b) The graph shows the number of cases of polio in the UK between 1948 and 1968.



(i) In which year was the number of cases of polio highest?

.....

(1)

(ii) Polio vaccination was first used in the UK in 1955.

How many years did it take for the number of cases of polio to fall to zero?

.....

(1)

(iii) There have been no cases of polio in the UK for many years. But children are still vaccinated against the disease.

Suggest **one** reason for this.

.....

.....

(1)

(Total 6 marks)

7

The MMR vaccine is used to protect children against measles, mumps and rubella.

(a) Explain, as fully as you can, how the MMR vaccine protects children from these diseases.

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(3)

(b) Read the passage.

> Autism is a brain disorder that can result in behavioural problems. In 1998, Dr Andrew Wakefield published a report in a medical journal. Dr Wakefield and his colleagues had carried out tests on 12 autistic children.
>
> Dr Wakefield and his colleagues claimed to have found a possible link between the MMR vaccine and autism.
>
> Dr Wakefield wrote that the parents of eight of the twelve children blamed the MMR vaccine for autism. He said that symptoms of autism had started within days of vaccination.
>
> Some newspapers used parts of the report in scare stories about the MMR vaccine. As a result, many parents refused to have their children vaccinated.
>
> Dr Wakefield's research was being funded through solicitors for the twelve children. The lawyers wanted evidence to use against vaccine manufacturers.

Use information from the passage above to answer these questions.

(i) Was Dr Wakefield's report based on reliable scientific evidence?

Explain the reasons for your answer.

.....

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.....

.....

(2)

(ii) Might Dr Wakefield's report have been biased?

Give the reason for your answer.

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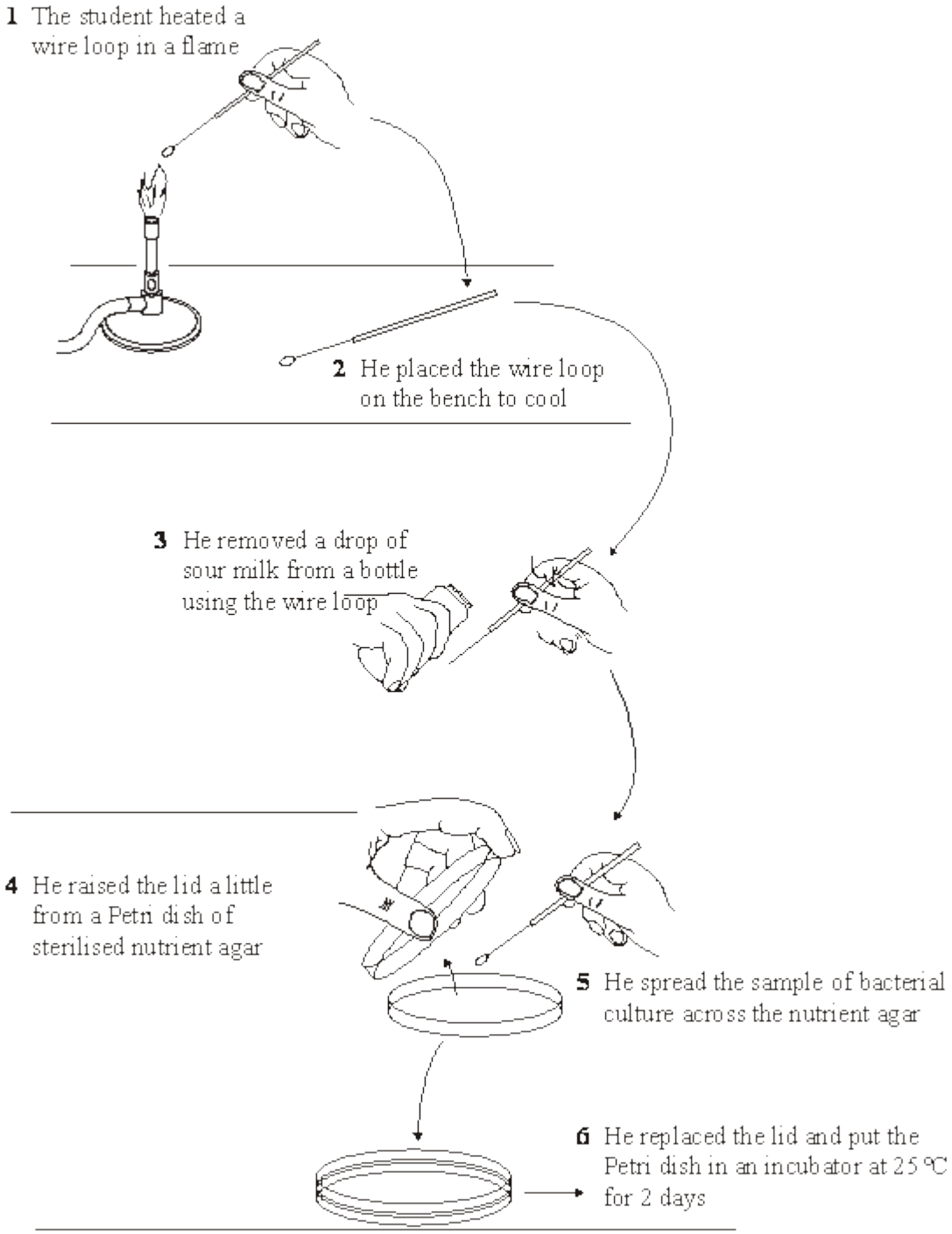
(1)
(Total 6 marks)

8 The diagram shows how a student transferred some sour milk from a bottle to a Petri dish of nutrient agar.



List A gives four actions carried out by the student.
List B gives five possible effects of these actions.

Draw a straight line from each action in List **A** to its effect in List **B**.
Draw only **one** line from each action.

List A – Action	List B – Effect
Heating loop in flame	Risk of contamination with bacteria increased
Placing loop on bench to cool	Risk of bacteria entering decreased
Only lifting lid of petri dish a little	Kills bacteria
Placing petri dish in incubator at 25°C rather than 35°C	Prevents air entering
	Risk of growth of pathogens decreased

(Total 4 marks)

9 Pathogens can enter the body and cause disease.

(a) (i) Name **one** type of medicine which kills bacteria in the body.

.....

(1)

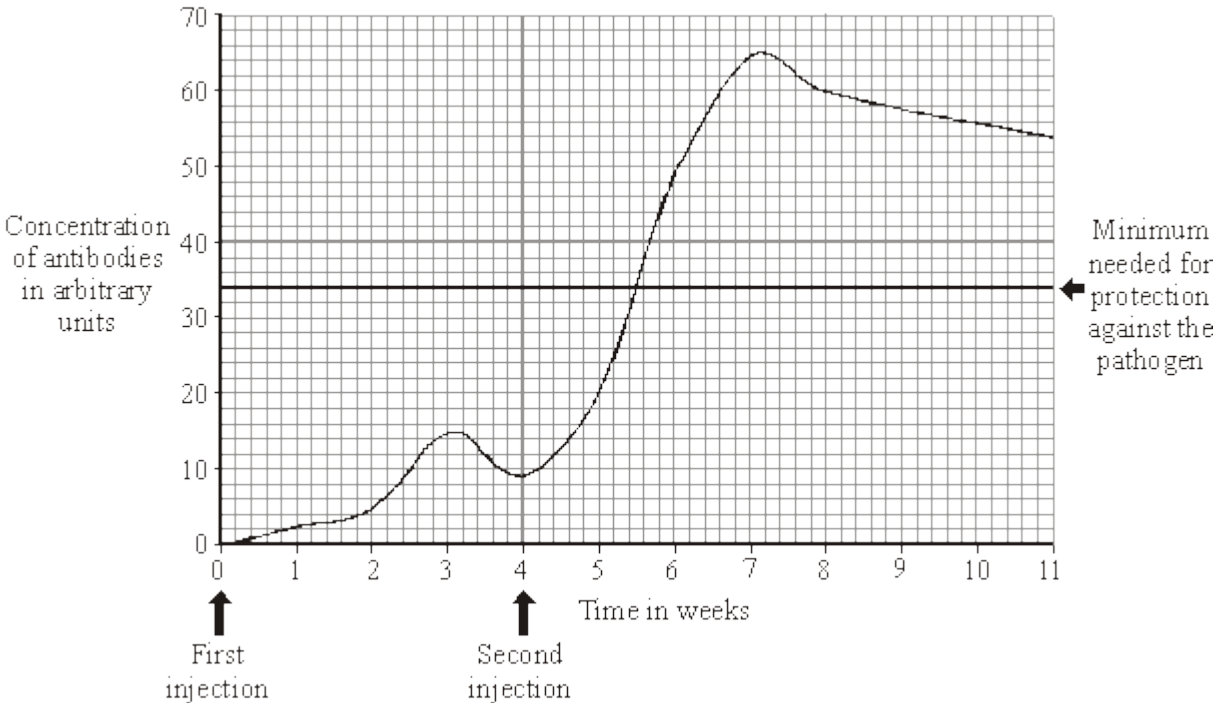
(ii) Name **one** type of medicine which helps to relieve the symptoms of infectious disease.

.....

(1)

(b) Vaccination protects us from pathogens.

The graph shows the concentration of antibodies in the blood of a person after two injections of vaccine given four weeks apart.



(i) How long after the first injection did it take for the concentration of antibodies to reach the minimum level for protection against the pathogen?

..... weeks

(1)

(ii) Describe what happened to the concentration of antibodies in the blood from week 0 to week 7.

.....

.....

.....

.....

.....

.....

.....

(3)

(iii) Would you expect the concentration of antibodies to stay above the level needed for protection against the pathogen over the next ten years?

Draw a ring around your answer. **Yes** / **No**

Give a reason for your answer.

.....

.....

(1)

(Total 7 marks)

10 Pathogenic bacteria and viruses may make us feel ill if they enter our bodies.

(a) Why do bacteria and viruses make us feel ill?

Bacteria .....

.....

Viruses .....

.....

(2)

(b) Most drugs that kill bacteria cannot be used to treat viral infections.

Explain why.

.....

.....

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.....

.....

(2)

(c) Antibiotic-resistant strains of bacteria are causing problems in most hospitals.

Explain, as fully as you can, why there has been a large increase in the number of antibiotic-resistant strains of bacteria.

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(4)
(Total 8 marks)

11 (a) Use words from the box to complete the sentences about curing disease.

antibiotics	**antibodies**	**antitoxins**	**painkillers**	**statins**

The substances made by white blood cells to kill pathogens are called.....

The substances made by white blood cells to counteract poisons produced by pathogens are called .....

Medicines which kill bacteria are called .....

(3)

(b) The MMR vaccine protects people against three diseases.

Write down the names of **two** of these diseases.

1 .....

2 .....

(2)

(c) All vaccinations involve some risk.

The table shows the risk of developing harmful effects:

- from the disease if a child is **not** given the MMR vaccine;
- if a child **is** given the MMR vaccine.

Harmful effect	**Risk of getting the harmful effect from the disease (if not vaccinated)**	**Risk of getting the harmful effect from MMR vaccine**
Convulsions	1 in 200	1 in 1000
Meningitis	1 in 3000	Less than 1 in 1 000 000
Brain damage	1 in 8000	0

A mother is considering if she should have her child vaccinated with the MMR vaccine.

Use information from the table to persuade the mother that she should have her child vaccinated.

.....

.....

.....

.....

(2)

(d) The vaccine used to protect us from the Hepatitis B virus is produced by genetic engineering.

Yeast cells are used to produce the vaccine.

Use words from the box to complete the sentence.

chromosomes	**drugs**	**enzymes**	**genes**	**hormones**

To produce the vaccine ..... are used to cut out .....

from the Hepatitis B virus which are then inserted into the yeast cells.

(2)
(Total 9 marks)

12 Controlling infections in hospitals has become much more difficult in recent years.

(a) Explain why MRSA is causing problems in many hospitals.

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(2)

(b) The pioneer in methods of treating infections in hospitals was Ignaz Semmelweiss. He observed that women whose babies were delivered by doctors in hospital had a death rate of 18% from infections caught in the hospital. Women whose babies were delivered by midwives in the hospital had a death rate of 2%. He observed that doctors often came straight from examining dead bodies to the delivery ward.

(i) In a controlled experiment, Semmelweiss made doctors wash their hands in chloride of lime solution before delivering the babies. The death rate fell to about 2% – down to the same level as the death rate in mothers whose babies were delivered by midwives.

Explain why the death rate fell.

.....

.....

(1)

(ii) Explain how Semmelweiss's results could be used to reduce the spread of MRSA in a modern hospital.

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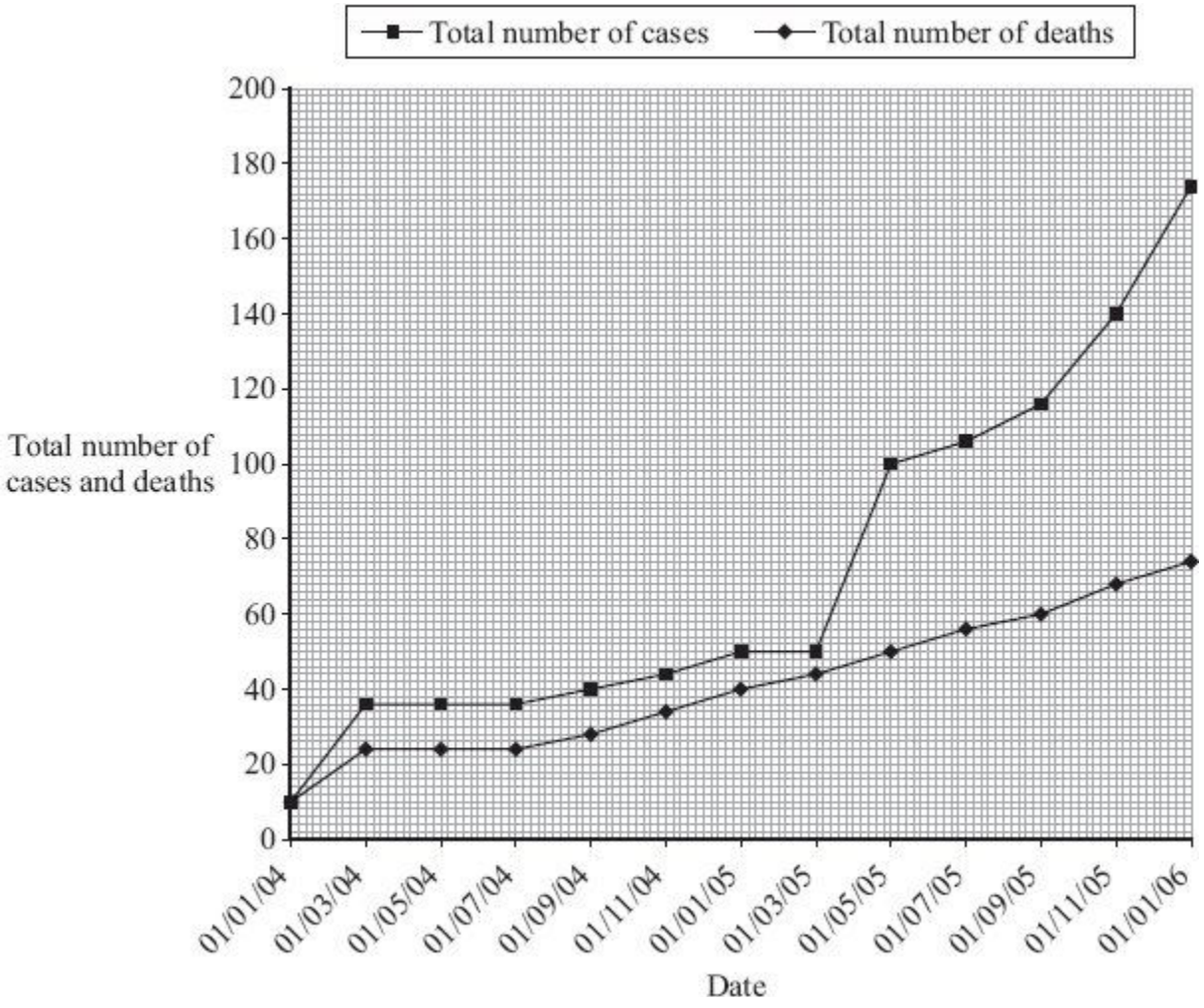
(2)
(Total 5 marks)

13 Scientists began to keep records of cases of H5N1 bird flu in humans in January 2004.

The graph shows the total number of cases of bird flu in humans and the total number of deaths up to January 2006.



(a) (i) How many people had died from bird flu up to 01/07/05?

.....

(1)

(ii) Describe, as fully as you can, how the number of cases of bird flu in humans changed between 01/07/04 and 01/01/06.

.....

.....

.....

.....

(2)

(b) At present, humans can only catch bird flu from contact with infected birds. The bird flu virus may mutate into a form that can be passed from one human to another.

Explain why millions of people may die if the bird flu virus mutates in this way.

.....

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.....

(2)

(Total 5 marks)

14 (a) (i) Some diseases can be tackled by using antibiotics and vaccination.
Explain fully why antibiotics cannot be used to cure viral diseases.

.....

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.....

(2)

(ii) A recent study found that babies in 90 % of hospitals are infected with the MRSA bacterium.

Explain how the MRSA bacterium has developed resistance to antibiotics.

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(2)

(b) A person can be immunised against a disease by injecting them with an inactive form of a pathogen.

Explain how this makes the person immune to the disease.

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(3)
(Total 7 marks)

15 In the eighteenth century, surgeons did not wear special clothing or wash their hands before operations. Many of their patients died from infections.

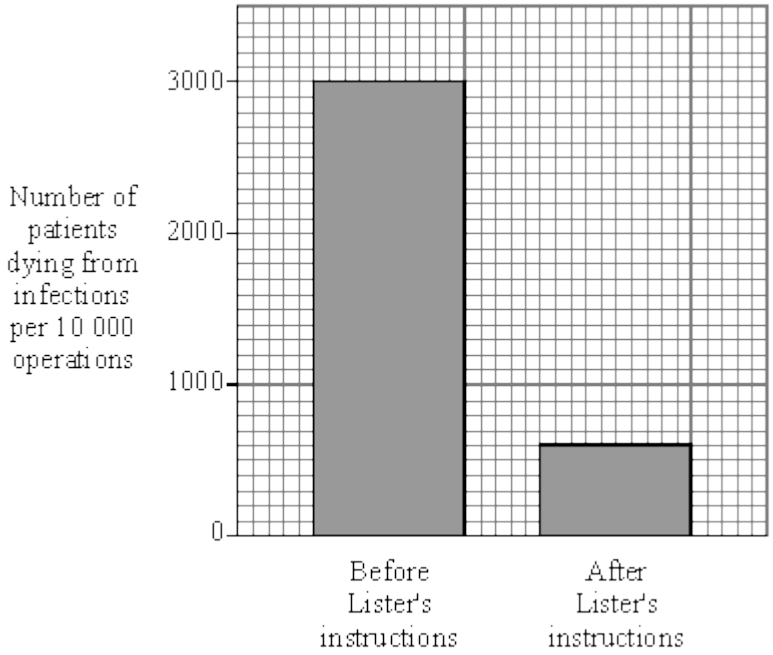
(a) Suggest why patients often died from infections after operations.

.....

(1)

(b) In the nineteenth century, Joseph Lister told surgeons to use sprays of carbolic acid in operating theatres and to wash their hands.

The graph shows the effect that using Lister's instructions had on the number of patients who died from infections after surgery.



Describe how Lister's instructions affected the number of patients dying from infections after surgery.

.....

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(2)

(Total 3 marks)

16 The table shows changes in resistance to the antibiotic penicillin in one species of bacterium between 1991 and 1996.

Years	Percentage of cases where bacteria were resistant to penicillin
1991 – 92	7
1993 – 94	14
1995 – 96	22

A doctor was asked to treat a patient who had a sore throat.

(i) How does penicillin help to treat infection?

.....

(1)

(ii) Use the data in the table to suggest why the doctor should **not** prescribe penicillin.

.....

.....

.....

.....

(2)

(Total 3 marks)

17 Mumps is a disease caused by a virus. Mumps vaccine is usually given to children as part of the MMR vaccine.

(a) What diseases, other than mumps, does the MMR vaccine protect against?

.....

(2)

(b) Mumps vaccines contain mumps viruses. Suggest why these viruses do not cause mumps.

.....

.....

(1)

(c) Explain how the vaccine makes someone immune to mumps.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(5)

(d) A child who has not been given the mumps vaccine catches mumps. Suggest why a doctor would **not** give antibiotics to cure the child of mumps.

.....

.....

(1)
(Total 9 marks)

18 Hepatitis B is a liver disease caused by a virus. The virus is found in body fluids such as blood, saliva and urine. Diagram **1** shows the structure of the virus in cross section.

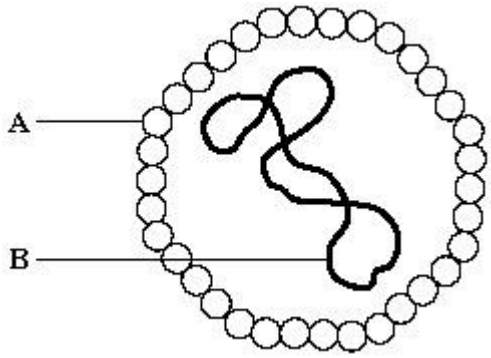
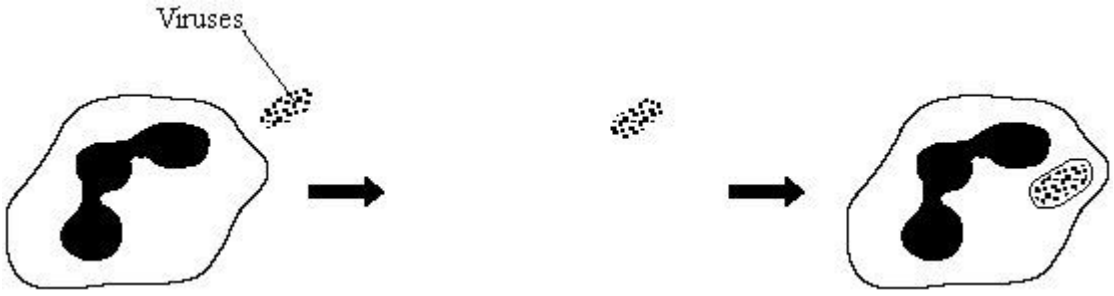


Diagram 1

(a) The human body has several natural defences against viruses. Some of these prevent viruses from entering the body. Others act once the viruses have entered.

(i) Diagram **2** shows a white blood cell attacking a group of viruses.

Complete diagram **2** by drawing the 2nd stage.



1st stage **2nd stage** **3rd Stage**

Diagram 2

(1)

(ii) What type of chemical is released by some white blood cells to attack viruses?

.....

(1)

(b) Hepatitis B is more likely to be spread among people who share needles when they inject drugs. Use information given at the beginning of this question to explain why this is so.

.....

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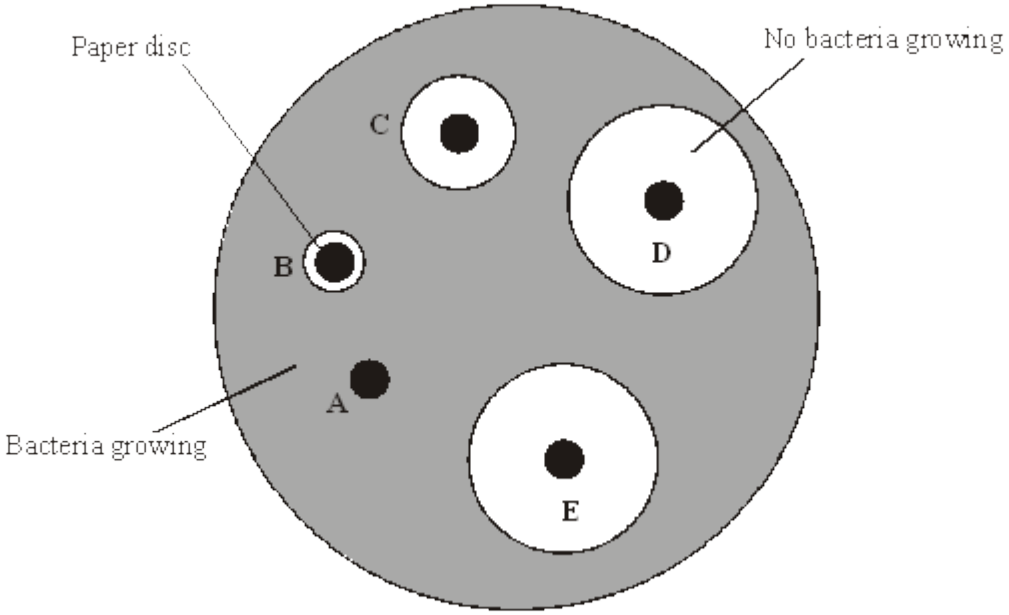
.....

.....

(2)
(Total 4 marks)

19 An investigator placed paper discs containing different concentrations of an antibiotic onto a culture of bacteria in a petri dish.

After an incubation period of two days, the dish looked like this.



(a) Explain why there are areas around some of the paper discs where no bacteria are growing.

.....

.....

(2)

(b) The concentration of the antibiotic on the paper discs is given in the table, along with the diameter of the circles where no bacteria are growing.

Disc	Concentration of the antibiotic in units	Diameter of circle where no bacteria are growing, in mm
A	0	0
B	2	8
C	4	14
D	6	26
E	10	26

What effect does an increase in the concentration of the antibiotic have on the growth of the bacteria?

.....

.....

.....

(2)

(c) When students carry out this experiment, they need to take several safety precautions.

The precautions include:

- passing inoculating loops through a flame
- sealing the lid of the petri dish with tape
- incubating at a maximum temperature of 25 °C.

Explain why each of these precautions is necessary.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific word.

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(5)

(d) Scientists are concerned that many bacteria are developing resistance to antibiotics.

Suggest **two** ways by which this problem could be limited.

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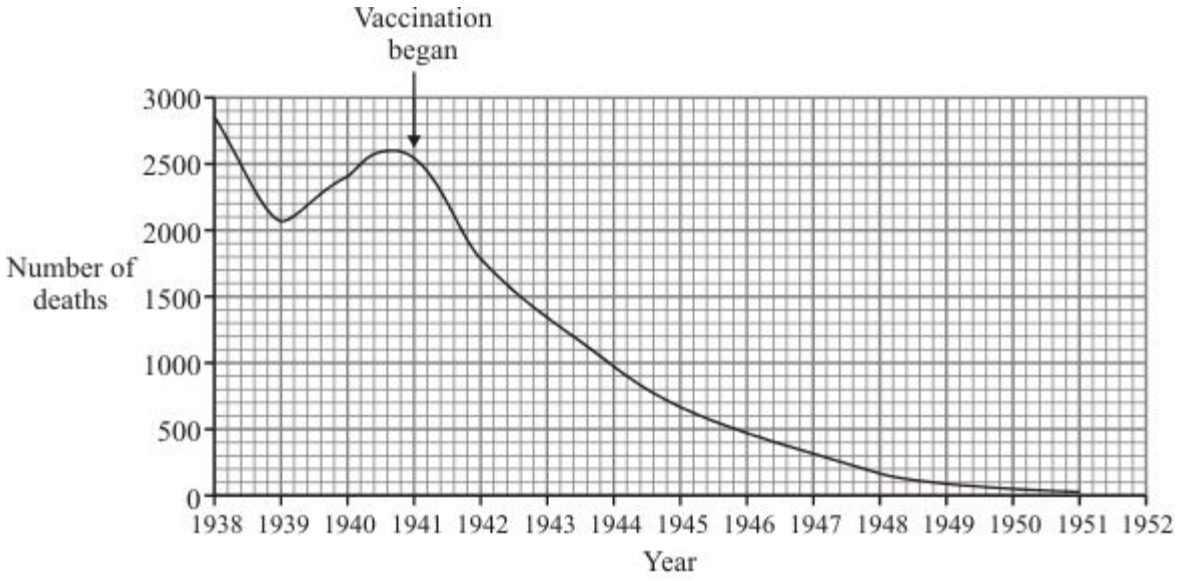
(2)

(Total 11 marks)

20 Diphtheria is a disease of the human breathing system. The graph shows the number of deaths from diphtheria in the United Kingdom between 1938 and 1951. Vaccination against diphtheria was begun in 1941.



(a) What evidence in the graph suggests that vaccination protects people from diphtheria?

.....

(1)

(b) Complete the passage by choosing the correct words from the box.

antibodies	**bacteria**	**platelets**
red blood cells	**white blood cells**	

During vaccination, harmless ..... are injected into the body.

This causes ..... to make ..... which help to protect the body against diphtheria.

(3)
(Total 4 marks)

21 Doctors give antibiotics to patients to kill bacteria in their bodies.

Explain how the overuse of antibiotics has led to the evolution of antibiotic-resistant bacteria.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(Total 3 marks)

22 Read the passage.

> MMR is a triple vaccine used to protect against three viral diseases. Weakened strains of the three viruses are injected together. The weakened strains cause the body to become immune to the diseases. The vaccine is usually given to children between one and two years old.
>
> Some people believe that the vaccine can trigger a response called autism in children. Autism damages the mental and social development of the child. The vaccine can also lead to problems in the large intestine.

(a) What are the **three** diseases that the MMR vaccine protects against?

.....

(1)

(b) Use the information in the passage and your own knowledge to evaluate whether a parent should or should not have their child vaccinated.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(5)
(Total 6 marks)

23 The following are precautions taken when preparing a streak of bacteria on an agar jelly plate.

Give a reason for each.

(i) The inoculating loop is heated in a hot bunsen flame.

REASON:

.....

.....

(1)

(ii) The loop is allowed to cool before putting it into the bacterial culture.

REASON:

.....

.....

(1)

(iii) The lid of the petri dish is only partly opened.

REASON:

.....

.....

(1)

(iv) The petri dish is sealed with sticky tape.

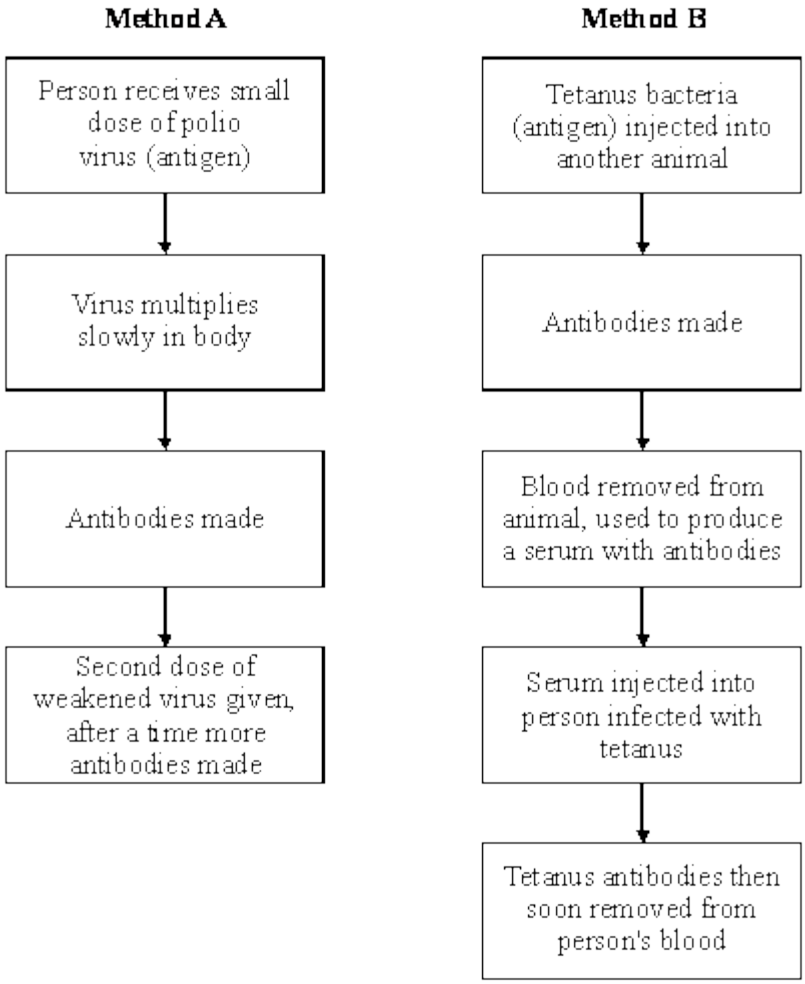
REASON:

.....

.....

(1)
(Total 4 marks)

24 The diagram shows two methods which are used to give humans protection against disease. **Method A** shows active immunity and **Method B** shows passive immunity. **Method A** can be used against polio. **Method B** is often used against tetanus.



(a) What is the name of the substances produced by the body which destroy harmful viruses and bacteria?

.....

(1)

(b) Why does **Method A** give long lasting protection against polio?

.....

(1)

(c) Why does **Method B** not give long lasting protection against tetanus?

.....

(1)

(d) In immunisation against polio a second dose of the weakened virus is given (this is known as a booster). Suggest why this booster is necessary.

.....

(1)

(e) **Method A** would **not** be helpful for a person who had just been infected with tetanus bacteria. Explain the reason for this.

.....

.....

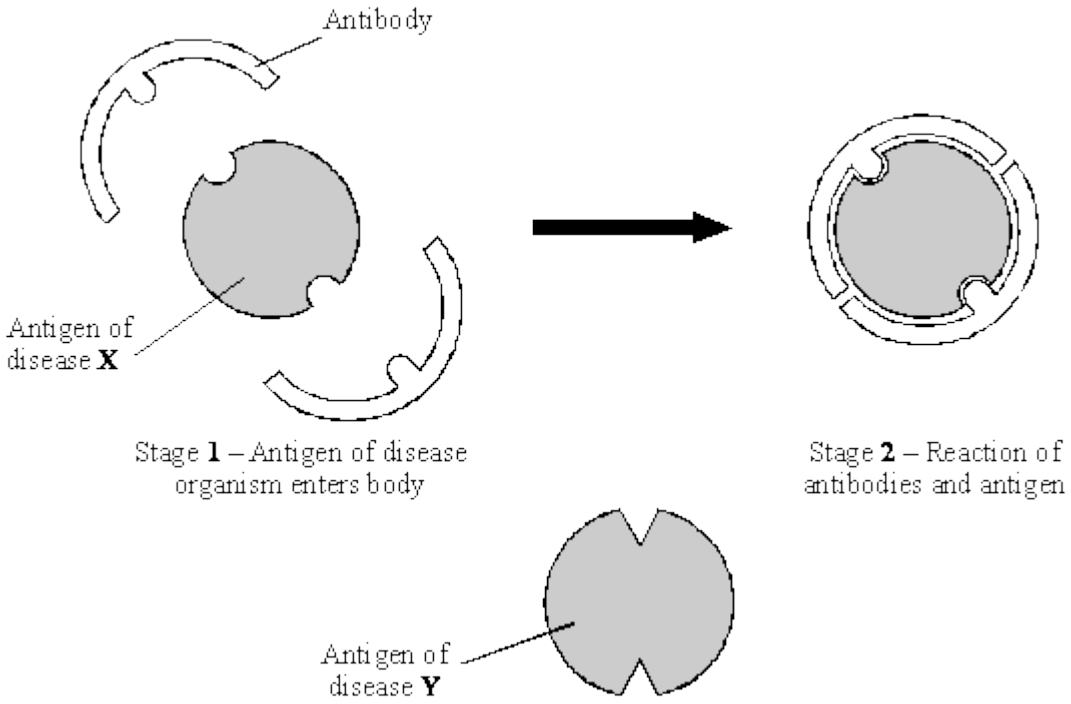
(2)

(f) Why is **Method B** very good for dealing quickly with an infection of tetanus?

.....

(1)
(Total 7 marks)

25 (a) Antibodies help to defend the body against disease. The diagram represents the reaction of antibody and antigen for disease **X.**



Using the diagram to help you, suggest why the body's defence against disease **X** would not be effective against disease **Y**.

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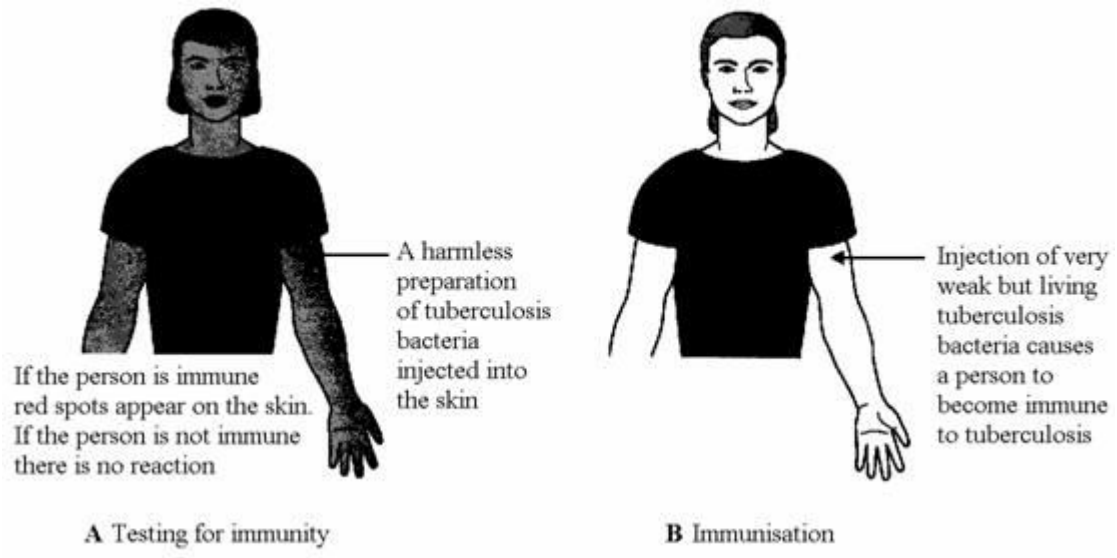
(2)

(b) Tuberculosis is a disease which is caused by a bacterium. The body is able to produce antibodies to destroy the bacteria which cause the disease. Some people are naturally immune. A person can be tested to find if they are immune.

Use information in the diagrams to help you answer the questions.



A Testing for immunity **B** Immunisation

(i) Suggest the possible cause of the reaction when a person who is already immune is tested, as shown in diagram **A**.

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(2)

(ii) Explain why the injection of tuberculosis bacteria (diagram **B**) causes immunity but does not cause the disease.

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(3)

(Total 7 marks)

26 Penicillin is an antibiotic which stops bacteria from reproducing. It was used a lot in the past to treat bacterial infections in humans and other animals. In many hospitals there are now strains of penicillin resistant bacteria.

Explain how natural selection could have produced these strains of penicillin resistant bacteria.

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(Total 5 marks)

27 The influenza virus damages the cells lining the respiratory tract causing sore throats.

Coughing and sneezing spread the virus.

(a) Give the correct term for this method of spreading an infection.

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(1)

(b) In an immunisation programme such as that for MMR (Measles, Mumps and Rubella), suggest why it is essential for a large proportion of the child population to be vaccinated in order to protect the few individuals who are unable to be vaccinated.

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(1)

(c) In some modern influenza vaccines the protein surface sub-units are separated from the virus coat and used for the vaccine. This stimulates an effective immune response in the same way as inactive pathogens.

(i) Explain how this immunity is produced in the body following vaccination, and how further illness from the same virus is prevented.

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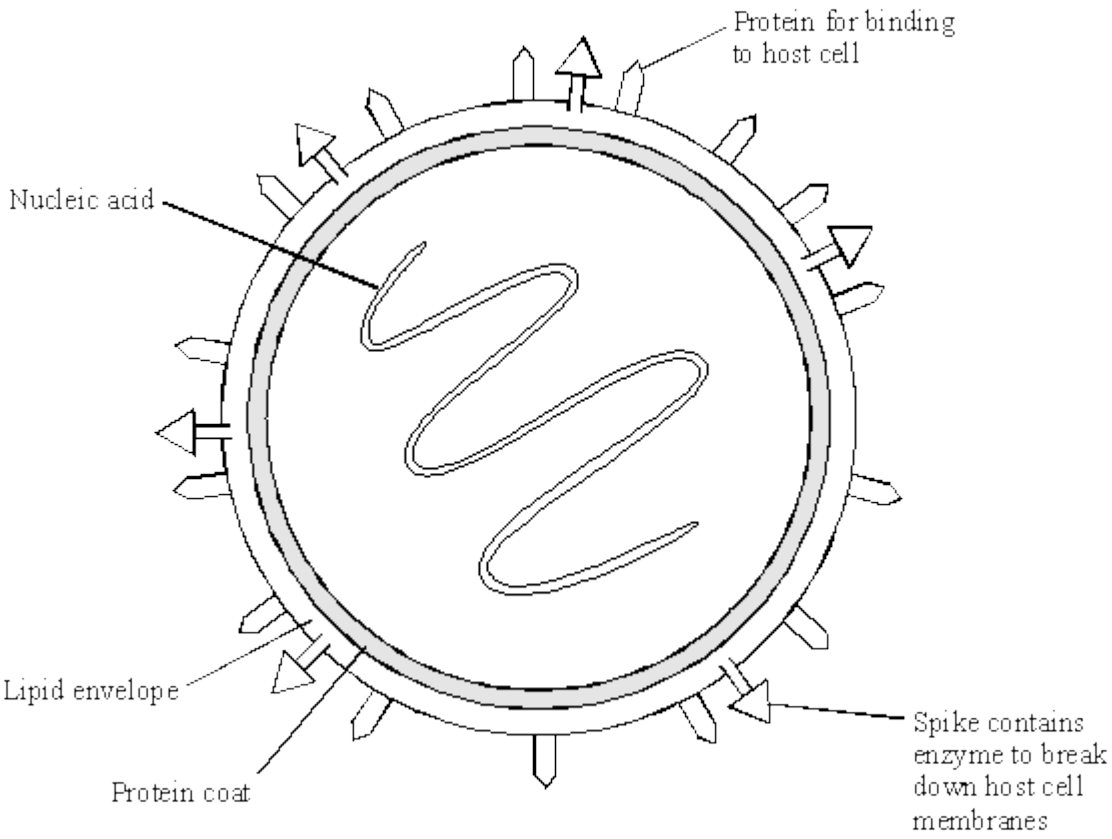
(4)

(ii) This type of immunity resulting from an influenza injection is described

as ..... immunity.

(1)

(d) The diagram shows the structure of an influenza virus.



Influenza epidemics can arise because the nucleic acid of the virus frequently changes. This results in changes in the virus structure and so a new strain of the virus is formed. A person who has had influenza or who has been vaccinated may not be immune to the new strain.

Explain why this is so, using the diagram of the influenza virus structure and your knowledge of immunity.

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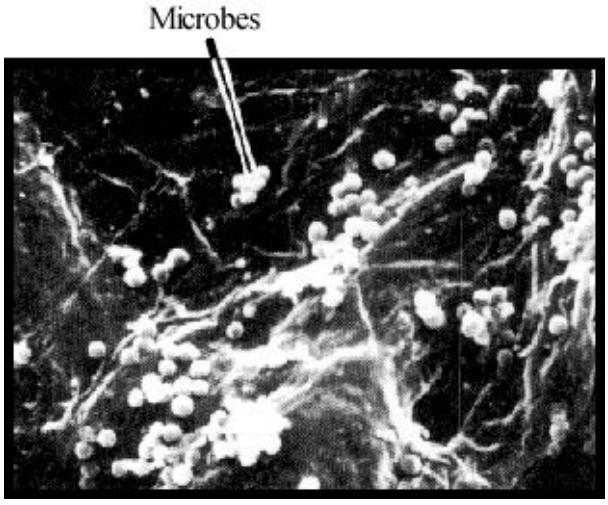
(3)
(Total 10 marks)

28 The photograph below shows human skin highly magnified. Groups of microbes can be seen on the skin.



Give **two** ways in which the body protects itself from these microbes.

1 .....

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2 .....

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(Total 2 marks)

29 (i) Give **two** ways in which white blood cells protect us from disease.

1 .....

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2 .....

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(2)

(ii) Explain, as fully as you can, how immunisation protects us from disease.

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(3)

(Total 5 marks)

30 (a) Explain how diseases caused by bacteria are usually treated by doctors.

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(2)

(b) Explain, as fully as you can, how white blood cells protect us from disease.

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(5)
(Total 7 marks)

31 (a) Explain, as fully as you can, how the body's white blood cells respond to infections.

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(4)

(b) Describe, in as much detail you can, how **one** method of immunisation protects us from a named disease.

Name of disease .....

How immunisation protects us from this disease.

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(3)
(Total 7 marks)

32 (a) Name **two** types of microbe which cause disease in humans.

1 .....

2 .....

(2)

(b) Why do we feel ill when we have an infectious disease?

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(1)

(c) Give **two** ways in which white blood cells protect us against disease.

1 .....

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2 .....

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(2)

(d) Explain, as fully as you can, how immunisation protects us against a named disease.

Name of disease: .....

How immunisation protects us: .....

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(3)

(Total 8 marks)

33 Read the following passage.

> One of the deadliest diseases seems to be making a comeback in Britain. Doctors are alarmed at the rising number of cases of tuberculosis (TB). TB is caused by microbes called bacteria. When people carrying the TB bacteria cough or sneeze, the TB bacteria get into the air. Other people may then breathe them in.

(a) Which organs will be infected first when someone breathes in the TB bacteria?

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(1)

(b) Explain how the TB bacteria inside the body may cause disease.

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(2)

(c) Name **one other** group of microbes that often causes disease.

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(1)

(d) Suggest why people who live in overcrowded areas are more likely to catch TB than people who live in less crowded areas.

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(1)

(e) People infected with a small number of TB bacteria often do **not** develop the disease.

Explain, as fully as you can, how the body defends itself against the TB bacteria.

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(3)
(Total 8 marks)

34 Read the following passage.

> One of the deadliest diseases in history to be making a comeback in Britain. Doctors are alarmed at the rising number of cases of tuberculosis (TB) over the past three years, after decades in which it had declined.
> In the middle of the last century TB accounted for 16% of all deaths in Britain. The turning point in the fight against TB came in 1882 when Robert Koch identified the bacterium that causes the disease. In 1906 two French scientists began developing the vaccine to provide immunity against TB. The vaccine, BCG, (so-called from the initials of the two scientists) has routinely been injected into children aged 12 or 13 who are not already infected with the TB bacterium. BCG does not protect people who are already infected with TB. Recently, however, some Health Authorities have dropped their school vaccination programme.

(a) People infected with a small number of TB bacteria often do **not** develop the disease.

Explain, as fully as you can, how the body defends itself against the TB bacteria.

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(3)

(b) The BCG vaccine contains a mild form of the TB bacterium. A person injected with it does **not** develop the disease.

Explain, as fully as you can, how the vaccine makes the person immune to tuberculosis.

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(3)

(c) Explain why the BCG vaccine is **not** effective as a cure for people who already have tuberculosis.

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(2)
(Total 8 marks)

35 A young child goes to school for the first time. Soon after, the child gets a cold and a sore throat.

(a) Explain, as fully as you can, what causes the child's illness.

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(2)

(b) The doctor tells the child's mother that children often get ill when they start school and mix with other children.

Why is a child more likely to get an infectious illness when he or she starts school?

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(1)

(c) The child gets better without taking any medicine. Explain how.

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(1)
(Total 4 marks)

36 Read the following passage.

'The immune system is the body's defence force. It protects against infections which might enter the body. The potential invaders include bacteria and viruses. The two basic defences are cells and chemicals. The best known action of defence cells is the ingesting and killing of microbes. The best known chemical defence is the antibody - a protein specially made to match with the surface of an invading microbe. Once covered with antibody, the microbe becomes easier to destroy.
So how do the invaders ever win? Part of the answer is that the chemical defenders take some time to become effective. When the body is infected for the first time by a particular microbe, there is a race between the multiplying microbes and the multiplying cells producing the antibody. Given time, the body usually wins; eventually enough antibodies are formed to overcome the invaders. But if the initial invasion force is large, or the immune system is weak, the battle may be lost.'

(a) (i) Which type of cells ingest and kill invading microbes? (lines 3 - 4)

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(1)

(ii) Give **two** circumstances in which the initial invasion force might be very large (lines 11 - 12).

1 .....

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2 .....

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(2)

(iii) After being ingested, the microbes are digested in the cells. Briefly explain what happens to the proteins that the microbes contain.

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(2)

(b) Explain how bacteria cause disease once they get into the body.

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(2)

(c) Name a type of medicine that kills bacteria inside the body.

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(1)

(d) People often risk first-time infection by a particular microbe while visiting other countries. People can be immunised against the disease that the microbe causes.

Explain, as fully as you can, how immunisation works.

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(3)

(Total 11 marks)

37 A child has a sore throat. The mother takes the child to the doctor. The doctor says that the child has a bacterial infection.

Explain how the infection makes the child ill.

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(Total 2 marks)

38 A child has a sore throat. The mother takes the child to the doctor. The doctor says that the child has a bacterial infection.

Explain how the infection makes the child ill.

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(Total 2 marks)

39 Read the passage about antibiotics.

> People do not always agree about the use of antibiotics in food production.
>
> If we put low doses of antibiotics in feed for animals such as cattle and sheep, it helps to produce high-quality, low-cost food. Antibiotics help to keep animals disease-free. They also help animals to grow. Animals get fatter quicker because they do not waste energy trying to overcome illness.
>
> The use of antibiotics in livestock feed means that there is a higher risk of antibiotic-resistant bacteria developing. The rapid reproduction of bacteria means there is always a chance that a population of bacteria will develop which is antibiotic-resistant. These could be dangerous to human health.

(a) *To gain full marks for this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

Explain how a population of antibiotic-resistant bacteria might develop from non-resistant bacteria.

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(3)

(b) Do you think that farmers should be allowed to put low doses of antibiotics in animal feed? Explain the reasons for your answer.

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(2)

(Total 5 marks)