Communicable Diseases

These practice questions can be used by students and teachers and is suitable for GCSE AQA Biology topic Questions 8641

Level: GCSE AQA Biology 8641

Subject: Biology

Exam board: GCSE AQA

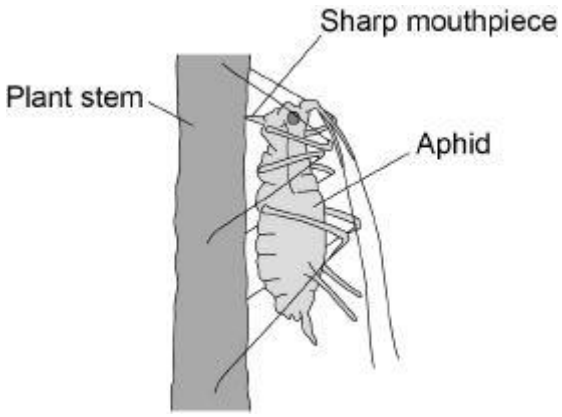
Topic: Communicable Diseases

Q1.

Aphids are small insects that carry pathogens.

Figure 1 shows an aphid feeding from a plant stem.

Figure 1



(a) An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

After feeding, the mouthpiece of an aphid contains a high concentration of dissolved sugars.

Which part of the plant was the aphid feeding from?

Tick **one** box.

- Palisade layer ☐
- Phloem ☐
- Stomata ☐
- Xylem ☐

(1)

(b) What is the process that transports dissolved sugars around a plant?

Tick **one** box.

Filtration ☐

Respiration ☐

Translocation ☐

Transpiration ☐

(1)

(c) Plants infected with aphids have stunted growth.

Explain **one** way the removal of dissolved sugars from the stem of the plant causes stunted growth.

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(2)

(d) Most aphids do not have wings when they hatch. After several generations, some aphids hatch which have wings and can fly.

Explain the advantage to the aphid of being able to fly.

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(2)

(e) The leaves of some plants release oils onto their surface.

Suggest how the production of oil on the surface of a leaf may protect the plant from aphids.

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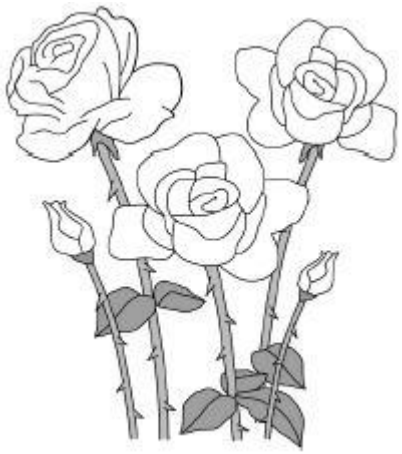
_____

(1)

Figure 2 shows part of a rose plant.

Figure 2



(f) Give **one** adaptation shown in **Figure 2** that helps the rose plant defend itself.

_____

_____

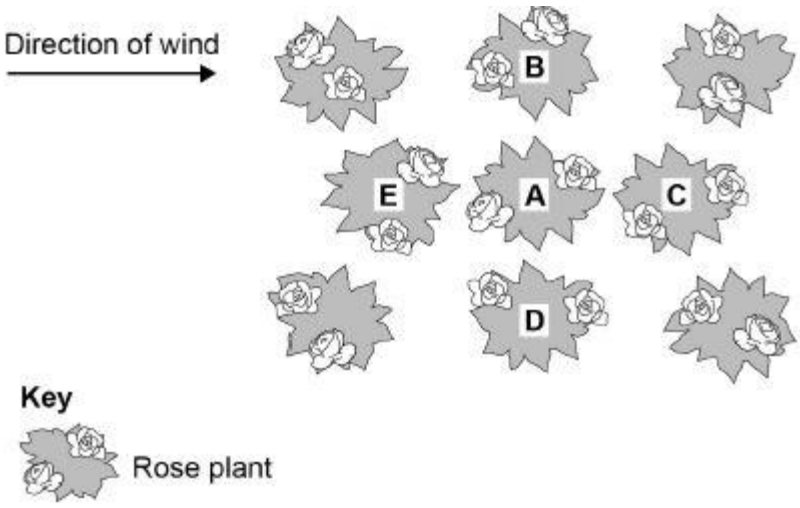
_____

_____

(1)

Figure 3 shows a plan of a garden containing rose plants.

Figure 3



(g) Plant **A** has the fungal disease rose black spot.

Which plant in **Figure 3** is the fungus likely to spread to first?

Give a reason for your answer.

Plant _____

Reason

_____

_____

_____

_____

_____

_____

(2)

(h) Suggest **one** way the gardener could reduce the spread of rose black spot to the other plants in the garden.

_____

_____

_____

_____

(1)

(Total 11 marks)

Q2.

Eating food containing *Salmonella* bacteria can cause illness.

(a) Two symptoms of infection by *Salmonella* are vomiting and diarrhoea.

What causes these symptoms?

_____

_____

_____

_____

(1)

(b) Give **two** ways a person with a mild infection of *Salmonella* can help prevent the spread of the bacteria to other people.

1.

_____

_____

_____

_____

2.

_____

_____

_____

_____

(2)

(c) In very serious infections of *Salmonella*, a doctor can prescribe drugs to kill the bacteria.

What type of drug can the doctor prescribe to kill the bacteria?

_____

_____

_____

_____

(1)

(d) A person with AIDS may take longer than a healthy person to recover from a *Salmonella* infection.

Explain why.

_____

_____

_____

_____

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(2)

(e) *Salmonella* bacteria can be transmitted from chickens to humans. Chickens can be vaccinated to prevent the transmission of *Salmonella* bacteria to humans.

Suggest **one** other way farmers could prevent the transmission of *Salmonella* from chickens to humans.

_____

_____

_____

_____

(1)

A restaurant owner employed a scientist to test the effectiveness of two kitchen cleaning liquids.

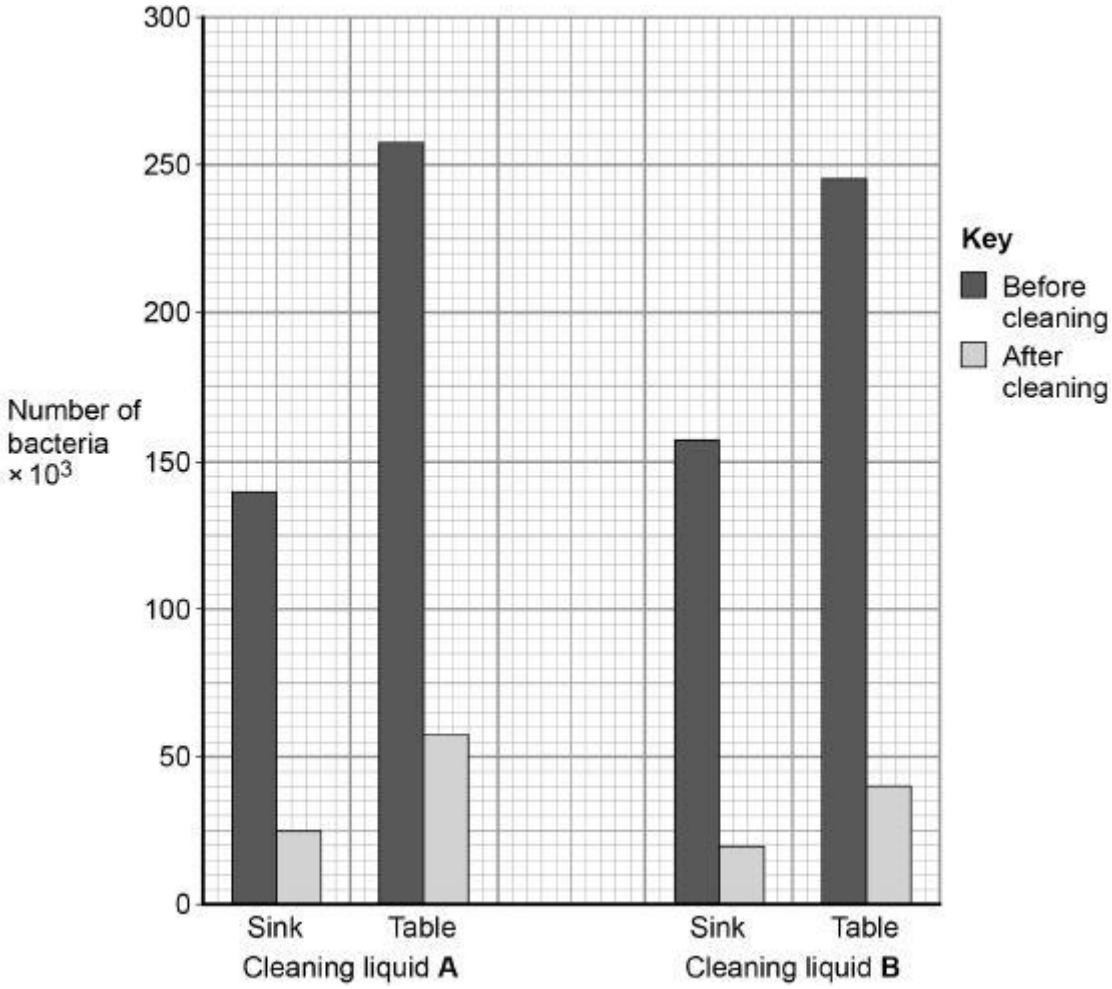
The scientist took samples from two work surfaces:

- before the surfaces had been cleaned with the cleaning liquids
- after the surfaces had been cleaned with the cleaning liquids.

The samples were then analysed for the number of bacteria they contained.

The results are shown in **Figure 1**.

Figure 1



(f) Which cleaning liquid is the more effective?

Give a reason for your answer.

Cleaning liquid _____

Reason

_____

_____

_____

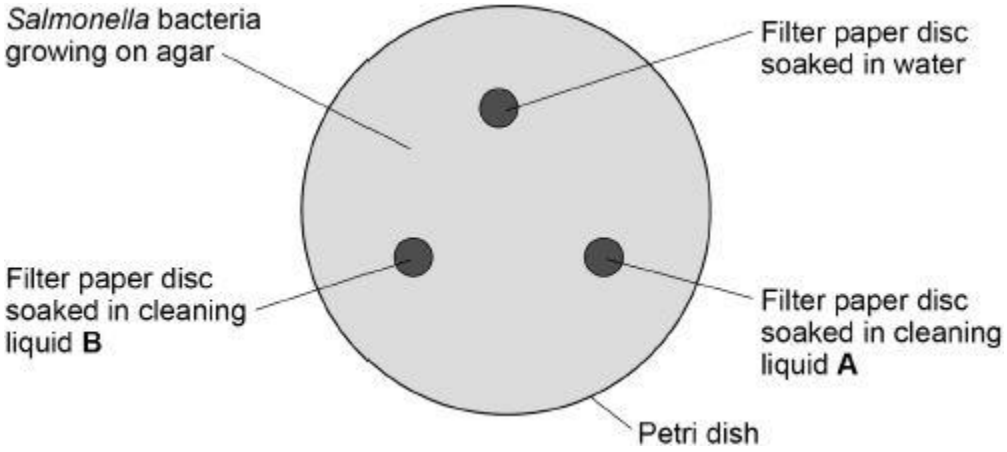
_____

(1)

The scientist investigated the effect of cleaning liquid **A** and cleaning liquid **B** on *Salmonella* bacteria grown in a laboratory.

Figure 2 shows the way the investigation was set up.

Figure 2



The Petri dish was placed in an incubator at 25 °C for 48 hours.

After 48 hours, the scientist calculated the area around each paper disc where no bacteria were growing.

The results are shown in the table below.

Filter paper disc	**Area around disc with no bacteria growing in cm²**
Water	0
Cleaning liquid **A**	11
Cleaning liquid **B**	13

(g) What measurement would the scientist need to take to calculate the area where no bacteria were growing?

_____

_____

_____

_____

(1)

(h) Give **one** change to the investigation that would allow the scientist to check if the results are repeatable.

_____

_____

_____

_____

(1)

(i) The scientist showed the results to the restaurant owner.

Both cleaning liquids cost the same per dm^3.

Suggest **one** other factor the restaurant owner should consider when choosing which cleaning liquid to use.

_____

_____

_____

_____

(1)

(Total 11 marks)

Q3.

Many diseases can be treated using drugs.

(a) Which type of pathogen can be killed by antibiotics?

Tick **one** box.

Bacteria	☐
Fungi	☐
Protists	☐
Viruses	☐

(1)

(b) Some drugs were originally extracted from living organisms.

Draw **one** line from each drug to the organism it was originally extracted from.

Drug	Organism the drug was originally extracted from
Aspirin	A mould
Digitalis	A virus
	Foxglove
	Rose
	Willow Tree

(2)

(c) New drugs must be tested before they can be used.

Give **one** reason why drugs should be tested.

_____

_____

(1)

(d) Doctors have developed a new drug.
The new drug has been tested on live animals.

What is the next stage in testing the new drug?

Tick **one** box.

- Testing on animal tissues in a laboratory ☐
- Testing on healthy volunteers ☐
- Testing on patients with the disease ☐

Testing on the whole human population ☐

(1)

(e) Vaccination can be used to prevent an illness in a person.

Explain how a vaccination can prevent an illness.

(4)

(Total 9 marks)

Q4.

Rose black spot is a disease of roses.

(a) What type of microorganism causes rose black spot?

Tick **one** box.

A bacterium ☐

A fungus ☐

A protist ☐

A virus ☐

(1)

(b) Explain how different **types of organism** defend themselves against microorganisms.

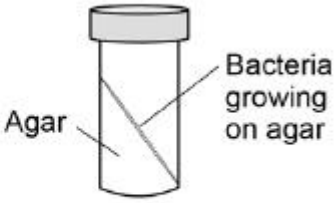
(6)

(c) A student tried to grow some bacteria in the laboratory.

The diagram shows some of the apparatus used.

Inoculating loop

Petri dish containing agar



Bottle containing the bacteria

This is the method used.

1. Remove the lid of the Petri dish.
2. Remove the lid of the bottle containing the bacteria.
3. Use the inoculating loop to remove some of the bacteria from the bottle.
4. Spread the bacteria over the agar using the inoculating loop.
5. Put the lid back on the Petri dish.
6. Put the Petri dish into an incubator at 25 °C for 24 hours.

Steps 1−5 could cause the sample of the bacteria on the petri dish to be contaminated.

Give **three** improvements to the method to prevent contamination.

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

_____

(3)

(d) Why did the student grow the bacteria at 25 °C rather than at 40 °C?

Tick **one** box.

So the bacteria grew more quickly ☐

So the bacteria grew more slowly ☐

To prevent the growth of a harmful pathogen ☐

To save money ☐

(1)

(Total 11 marks)

Q5.

A virus called RSV causes severe respiratory disease.

(a) Suggest **two** precautions that a person with RSV could take to reduce the spread of the virus to other people.

1. _____

_____

2. _____

_____

(2)

(b) One treatment for RSV uses monoclonal antibodies which can be injected into the patient.

Scientists can produce monoclonal antibodies using mice.

The first step is to inject the virus into a mouse.

Describe the remaining steps in the procedure to produce monoclonal antibodies.

_____

(3)

(c) Describe how injecting a monoclonal antibody for RSV helps to treat a patient suffering with the disease.

(2)

A trial was carried out to assess the effectiveness of using monoclonal antibodies to treat patients with RSV.

Some patients were given a placebo.

(d) Why were some patients given a placebo?

_____

(1)

A number of patients had to be admitted to hospital as they became so ill with RSV.

The results are shown in the table below.

Treatment received by patient	**% of patients within each group admitted to hospital with RSV**
Group **A**: Monoclonal antibody for RSV	4.8
Group **B**: Placebo	10.4

The trial involved 1 500 patients.

- Half of the patients (group **A**) were given the monoclonal antibodies.
- Half of the patients (group **B**) were given the placebo.

(e) Calculate the total number of patients admitted to hospital with RSV during the trial.

_____

_____

_____

_____

_____

_____

_____

_____

Total number of patients admitted to hospital = _____

(2)

(f) Evaluate how well the data in the table above supports the conclusion:

‘monoclonal antibodies are more effective at treating RSV than a placebo’.

_____

_____

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_____

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(2)

(Total 12 marks)

Q6.

Microorganisms can cause disease.

(a) Draw **one** line from each disease to the correct description.

	Can be spread by not washing hands thoroughly.
HIV	Can increase the chance of infection such as pneumonia.
	Part of the life cycle includes an insect.
Malaria	spread by cough and sneezes.
	Treated with stem cell.
Salmonella	Treated with fungicides.

(3)

(b) Gonorrhoea is a sexually transmitted disease.

A bacterium causes gonorrhoea.

What are the symptoms of gonorrhoea?

Tick **two** boxes.

Headache ☐

Pain when urinating	☐
Rash	☐
Vomiting	☐
Yellow discharge	☐

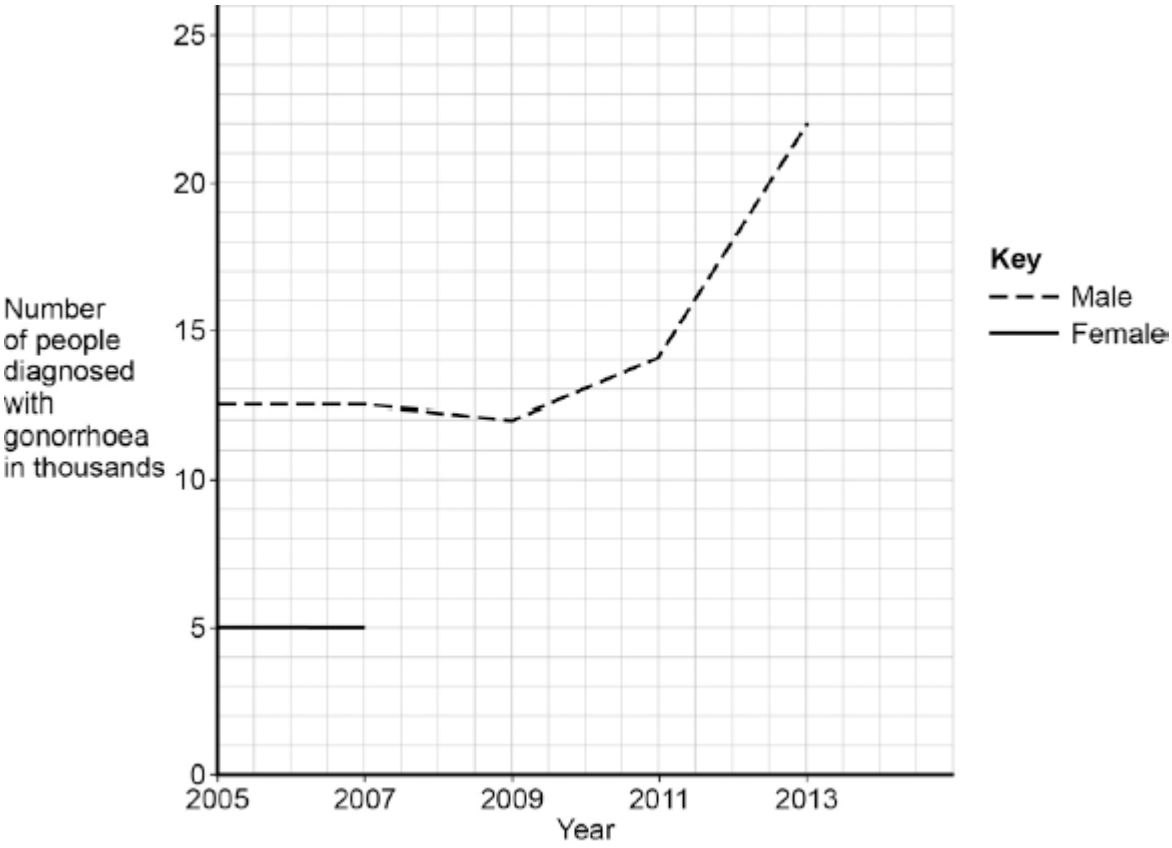
(2)

(c) The table below shows the number of people in the UK diagnosed with gonorrhoea in different years.

	Number of people diagnosed with gonorrhoea in thousands	
Year	**Female**	**Male**
2005	5.0	12.5
2007	5.0	12.5
2009	5.5	12.0
2011	6.0	14.0
2013	7.5	22.0

Use the data in the table to complete the graph below.

- The numbers for males have already been plotted.
- Only some of the numbers for females have been plotted.



(3)

(d) Describe the patterns in the numbers of males and females with gonorrhoea from 2005 to 2013.

Use the data in the graph.

(3)

(e) Gonorrhoea is treated with an antibiotic.

HIV is another sexually transmitted disease.

Explain why prescribing an antibiotic will **not** cure HIV.

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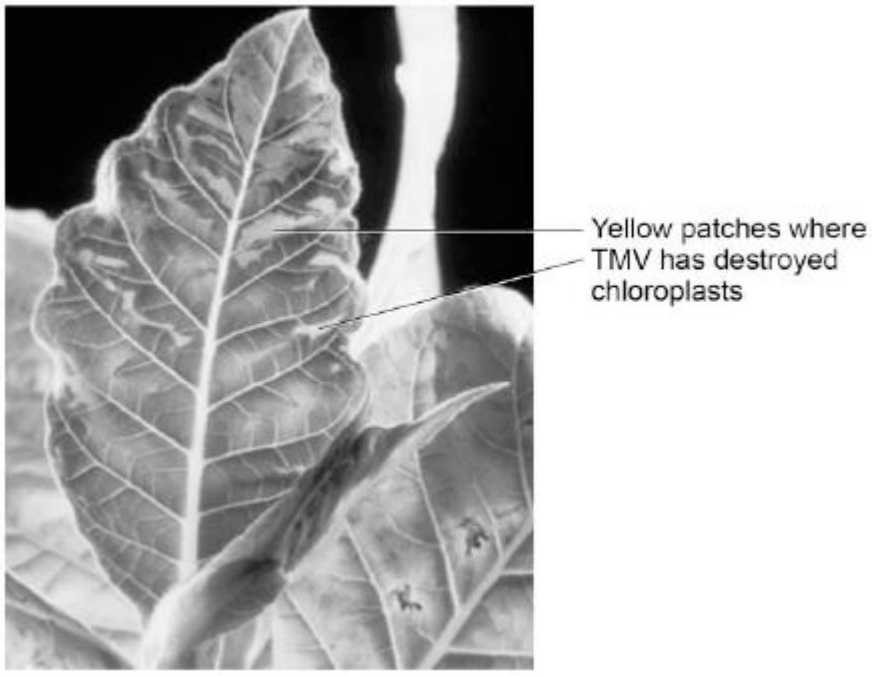
(2)

(Total 13 marks)

Q7.

Tobacco mosaic virus (TMV) is a disease affecting plants.

The diagram below shows a leaf infected with TMV.



© Nigel Cattlin/Visuals Unlimited/Getty Images

(a) All tools should be washed in disinfectant after using them on plants infected with TMV.

Suggest why.

(1)

(b) Scientists produced a single plant that contained a TMV-resistant gene.

Suggest how scientists can use this plant to produce **many** plants with the TMV-resistant gene.

(1)

(c) Some plants produce fruits which contain glucose.

Describe how you would test for the presence of glucose in fruit.

(2)

(d) TMV can cause plants to produce less chlorophyll.

This causes leaf discoloration.

Explain why plants with TMV have stunted growth.

(4)

(Total 8 marks)

Q8.

Microorganisms cause infections.

The human body has many ways of defending itself against microorganisms.

(a) Describe **two** ways the body prevents the entry of microorganisms.

1.

2.

(2)

(b) In 2014 the Ebola virus killed almost 8000 people in Africa.

Drug companies have developed a new drug to treat Ebola.

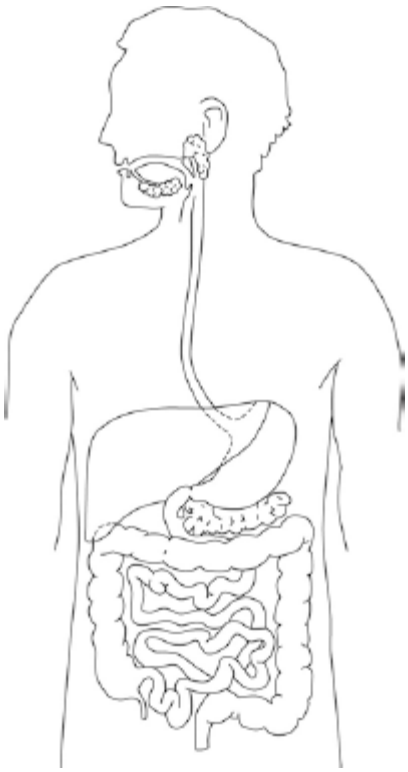
Explain what testing must be done before this new drug can be used to treat people.

(6)

(Total 8 marks)

Q9.

The diagram below shows the human digestive system.



(a) Label the stomach and pancreas on the diagram.

(1)

(b) Many people suffer from stomach ulcers caused by a species of bacteria called *Helicobacter pylori*.

The stomach is lined with a protective lining of mucus.

Helicobacter pylori are acid-tolerant bacteria which can damage this mucus lining.

Suggest how an infection with *Helicobacter pylori* might result in a stomach ulcer developing.

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(2)

(c) *Helicobacter pylori* can also cause stomach cancer.

Describe how a person infected with *Helicobacter pylori* could also develop liver cancer.

(3)

(d) Gluten is a form of protein found in some grains.

Describe the test you would use to find out if protein is present in food.

(2)

(e) Coeliac disease is a disease of the digestive system.

It damages the lining of the small intestine when foods that contain gluten are eaten.

When people with coeliac disease eat foods that contain gluten:

1. their immune system forms antibodies to gluten
2. these antibodies attack the lining of the small intestine
3. this causes inflammation in the intestines and damages the villi.

Symptoms of coeliac disease include poor growth.

Suggest why a person with coeliac disease might have this symptom.

(4)

(Total 12 marks)

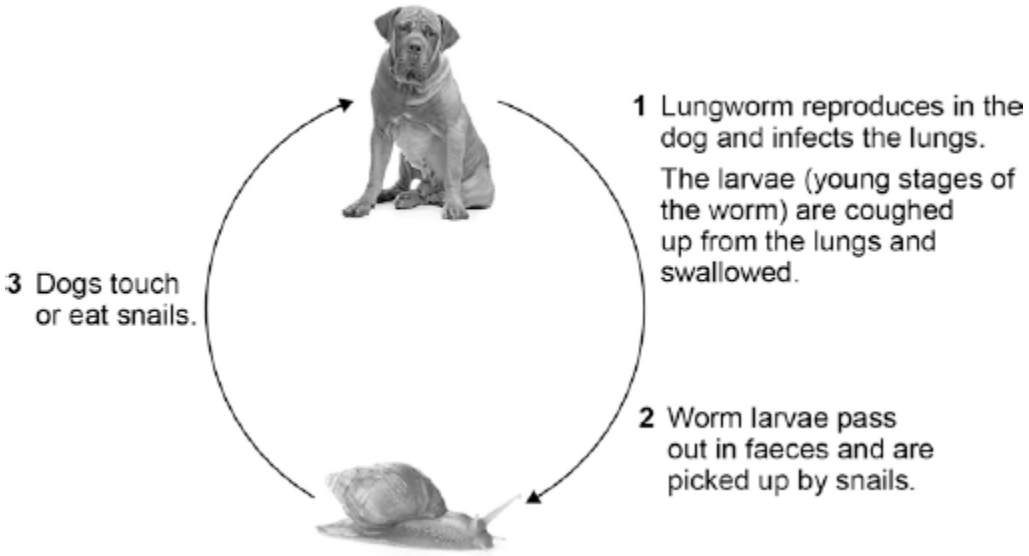
Q10.

Lungworm is an infection.

Lungworm can kill dogs.

It is caused by a small worm.

The diagram below shows the lifecycle of the lungworm.



Dog © Eriklam/iStock/Thinkstock, snail © Karandaev/iStock/Thinkstock

(a) What type of organism is represented by the snail in the lifecycle of the lungworm?

Tick **one** box.

Fungus ☐

Parasite ☐

Protist ☐

Vector ☐

(1)

(b) Suggest how the spread of the lungworm disease can be prevented.

_____

_____

_____

_____

_____

_____

_____

(3)

(c) Malaria is a disease spread by mosquitoes.

Describe **two** ways to control the spread of malaria.

1. _____

_____

_____

2. _____

_____

_____

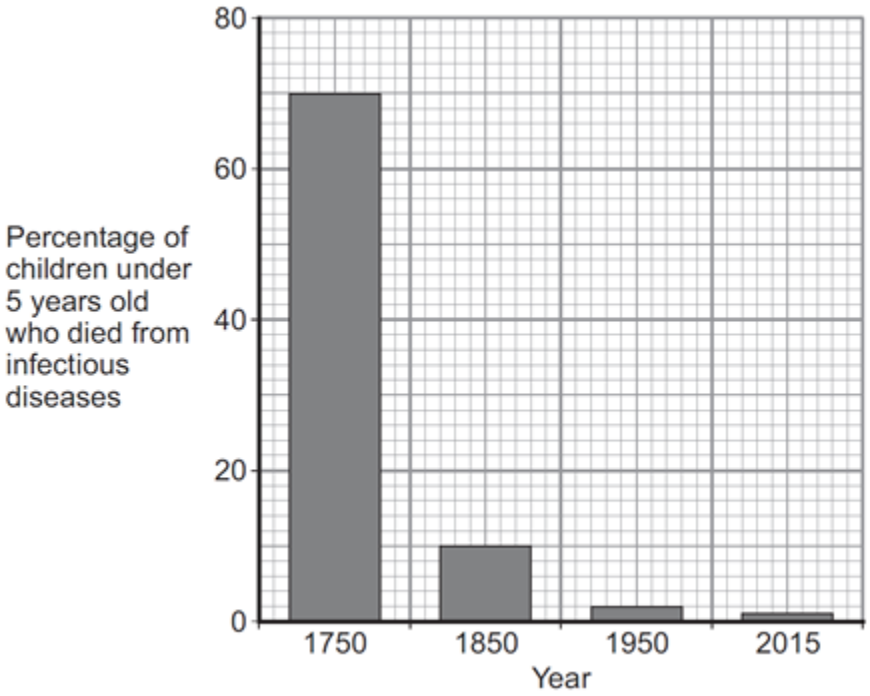
(2)

(Total 6 marks)

Q11.

Pathogens are microorganisms that cause infectious diseases.

(a) The graph shows the percentage of children under 5 years old who died from infectious diseases, in the UK, in four different years.



(i) Between 1750 and 1850 vaccinations were also developed.
What is in a vaccine?

Tick (✓) **one** box.

large amounts of dead pathogens ☐

large amounts of live pathogens ☐

small amounts of dead pathogens ☐

(1)

(ii) The advances in medicine had an effect on death rate.

Describe the effect these advances had between 1750 and 1850.

To gain full marks you should include data from the graph above.

_____

_____

_____

_____

_____

_____

_____

(2)

(b) Antibiotics were developed in the 1940s. Antibiotics kill bacteria.

(i) Which **one** of the following is an antibiotic?

Draw a ring around the correct answer.

cholesterol **penicillin** **thalidomide**

(1)

(ii) The use of antibiotics has **not** reduced the death rate due to all diseases to zero.

Suggest **two** reasons why.

1.

_____

_____

_____

2.

_____

_____

_____

(2)

(c) In school laboratories, bacteria should be grown at a maximum temperature of 25 °C.

Give **one** reason why companies testing new antibiotics grow bacteria at 37 °C.

_____

_____

_____

_____

(1)

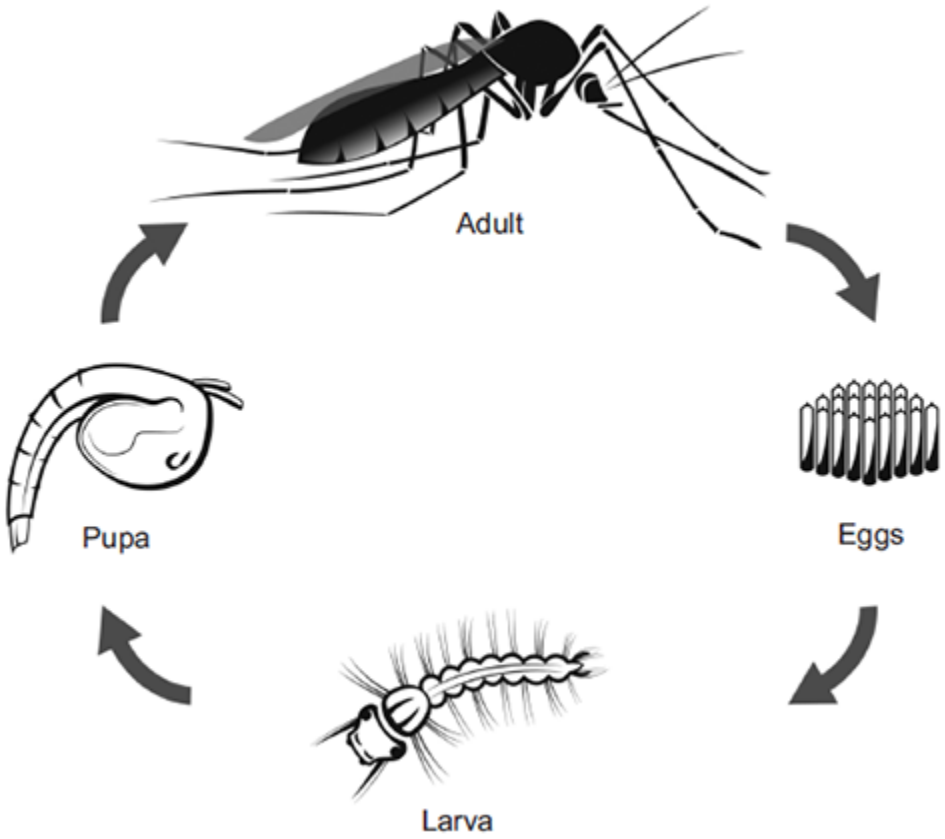
(Total 7 marks)

Q12.

Malaria is a disease caused by a microorganism carried by mosquitoes.

The microorganism is transferred to humans when adult female mosquitoes feed on human blood.

The figure below shows the life cycle of a mosquito.



© watcharapon/iStock

The World Health Organisation estimates that 3×10^8 people are infected with malaria every year.

Scientists estimate that malaria kills 2×10^6 people every year.

The people who are infected with malaria but do not die, may be seriously ill and need health care for the rest of their lives.

(a) Based on the estimated figures, what percentage of people infected with malaria die from the disease?

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(b) An internet article states:

1 Mosquito larvae are at the start of the food chain for some fish.
2 Adult mosquitoes provide food for bats and birds.
3 Mosquitoes are also important in plant reproduction because they feed from flowers of crop plants.

(i) The first sentence in the article is **not** correct.

Explain why.

_____

_____

_____

_____

_____

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_____

_____

(2)

(ii) A company plans to produce genetically modified (GM) adult male mosquitoes.
The GM mosquitoes will carry a gene from bacteria. The gene causes the death of offspring before they become adults.

Male mosquitoes do **not** feed on blood.
Scientists are considering releasing millions of adult male GM mosquitoes into the wild.

Do you think scientists should release millions of male GM mosquitoes into the wild?

In your answer you should give advantages and disadvantages of releasing GM mosquitoes into the wild.

_____

_____

(4)

(iii) Describe the process for creating a GM mosquito.

(3)

(Total 11 marks)

Q13.

People with type 1 diabetes inject insulin to control their blood glucose level.

A pancreas transplant is another treatment for type 1 diabetes.

One risk of a pancreas transplant is organ rejection.

(a) Explain why a transplanted organ may be rejected.

_____

_____

_____

_____

_____

_____

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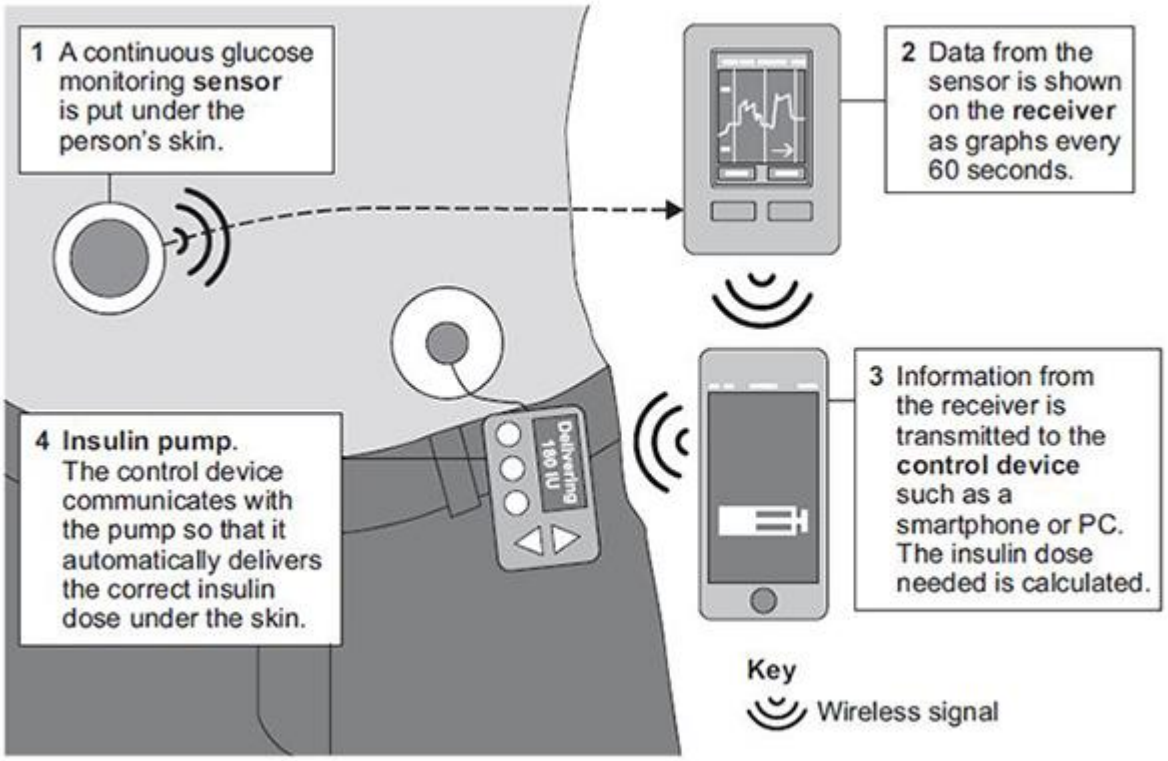
_____

_____

(3)

(b) Scientists have developed an artificial pancreas to treat type 1 diabetes.

The diagram below shows how an artificial pancreas works.



(i) A woman with type 1 diabetes has an artificial pancreas. The woman eats a meal high in sugar. The meal causes her blood glucose level to rise.

Use information from the diagram above to describe what happens to bring the blood glucose level of the woman back to normal.

(4)

(ii) The traditional way of monitoring and treating type 1 diabetes is to take a small sample of blood and put it on a test strip to find out how much insulin to inject.

Suggest **one** possible advantage, other than not having to do blood tests, of the method used in the diagram above.

(1)

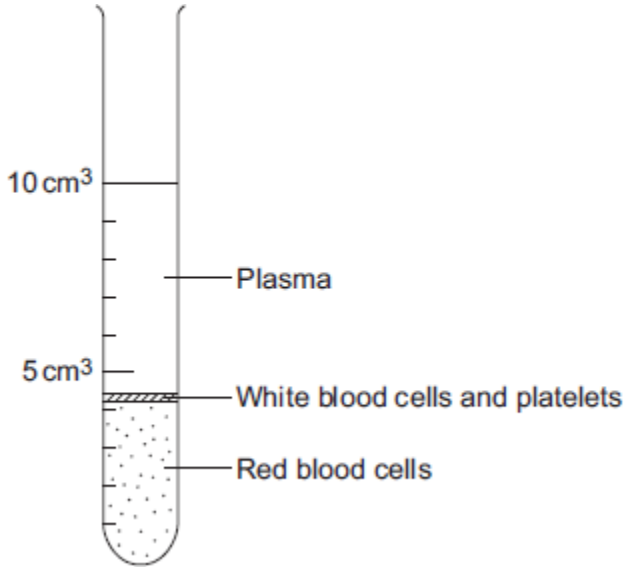
(Total 8 marks)

Q14.

The parts of the blood can be separated from each other by spinning the blood in a

centrifuge.

The image below shows the separated parts of a 10 cm^3 blood sample.



(a) Calculate the percentage of the blood that is made up of plasma.

_____

_____

_____

_____

Answer = _____ %

(2)

(b) Name **three** chemical substances transported by the plasma.

1. _____

2. _____

3. _____

(3)

(c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

White blood cells are part of the immune system. White blood cells help the body to defend itself against pathogens.

Describe how pathogens cause infections **and** describe how the immune system defends the body against these pathogens.

(6)

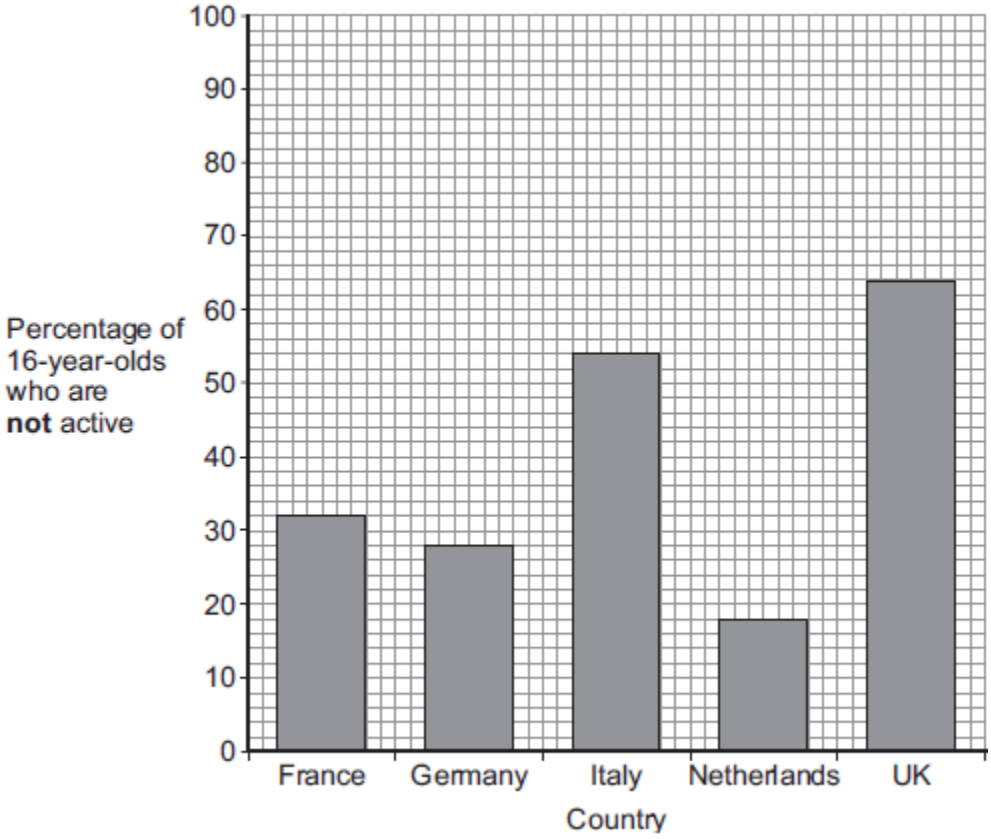
(Total 11 marks)

Q15.

Scientists investigated the effect of different factors on health.

(a) People who are **not** active may have health problems.

The graph shows the percentage of 16-year-olds in some countries who are **not** active.



(i) What percentage of 16-year-olds in the UK are **not** active?

_____ %

(1)

(ii) What percentage of 16-year-olds in the UK are **active**?

_____ %

(1)

(iii) A newspaper headline states:

People in the UK are the laziest in the world.

Information in **Figure 1** does **not** support the newspaper headline.

Suggest **one** reason why the newspaper headline may be wrong.

_____

_____

_____

(1)

(b) Doctors gave a percentage rating to the health of 16-year-olds.
100% is perfect health.

The table shows the amount of exercise 16-year-olds do and their health rating.

Amount of exercise done in minutes every week	**Health rating as %**
Less than 30	72
90	76
180	82
300	92

What conclusion can be made about the effect of exercise on health?

Use information from the table.

_____
_____

_____
_____

(1)

(c) Inherited factors can also affect health.

Give **one** health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

being malnourished **having a high cholesterol level** **having a deficiency disease**

(1)

(d) White blood cells are part of the immune system.

Use the correct answer from the box to complete each sentence.

antibiotics	**antibodies**	**pathogens**	**vaccines**

(i) When we are ill, white blood cells produce _____ to kill microorganisms.

(1)

(ii) Many strains of bacteria, including MRSA, have developed resistance to drugs called

_____

(1)

(Total 7 marks)

Q16.

Many people in the UK take sleeping pills.

(a) The drug thalidomide was developed as a sleeping pill in the 1950s. In the 1960s thalidomide was banned. Recently thalidomide has been used to treat other diseases.

Name **one** disease thalidomide is used to treat now.

_____

(1)

(b) The table shows information about the development of a new sleeping pill.

Type of test or trial	Preclinical	Clinical phase 1	Clinical phase 2	Clinical phase 3
Tested or trialled on	Cells, tissues or animals	20 −100 healthy volunteers	100 − 500 volunteer patients	1000 − 5000 volunteer patients
Number of compounds tested	>10 000	5 −10	2 − 3	1 (new sleeping pill)
Time taken for test or trial in years	1− 4	2− 4	1 − 3	2 − 4

(i) What is the shortest time taken to develop a new sleeping pill?

_____ years

(1)

(ii) What is the **range** for the number of volunteers needed to complete all the clinical trials for the new sleeping pill?

_____

(1)

(c) Drugs are trialled to check for side effects on people.

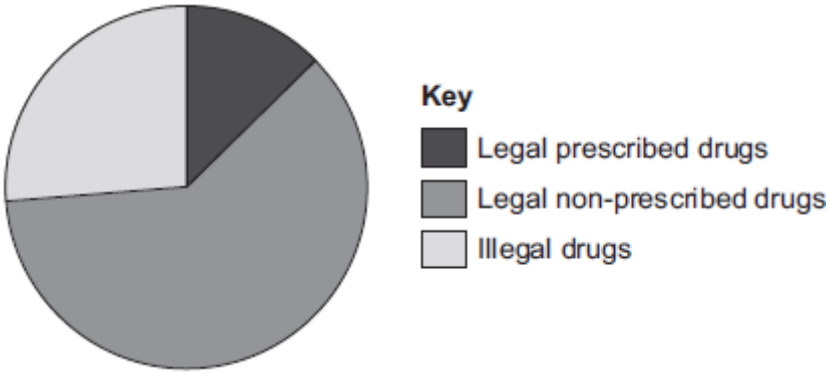
Give **one** other reason why drugs are trialled.

_____

_____

(1)

(d) The pie chart shows the impact on the health of the population caused by drugs from different sources.



(i) Legal non-prescribed drugs have a greater impact on the health of the population than illegal drugs.

Suggest **two** reasons why.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(ii) Drugs change chemical processes in a person's body.

Why is it difficult for a person to stop taking certain drugs?

_____

_____

_____

_____

(1)

(Total 7 marks)

Q17.

Antibiotics can be used to protect our bodies from pathogens.

(a) What is a pathogen?

_____

_____

_____

_____

(1)

(b) Bacteria may become resistant to antibiotics.

How can doctors reduce the number of bacteria that become resistant to antibiotics?

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(c) Scientists grow microorganisms in industrial conditions at a higher temperature than is used in school laboratories.

(i) Which temperature would be most suitable for growing bacteria in industrial conditions?

Draw a ring around the correct answer.

25 °C **40 °C** **100 °C**

(1)

(ii) What is the advantage of using the temperature you gave in part (c)(i)?

_____

_____

(1)

(Total 5 marks)

Q18.

Some infections are caused by bacteria.

(a) The genetic material is arranged differently in the cells of bacteria compared with animal and plant cells.

Describe **two** differences.

_____

_____

_____

_____

(2)

(b) Tuberculosis (TB) is an infection caused by bacteria.

The table below shows the number of cases of TB in different regions of southern England from 2000–2011.

Number of cases of TB per 100 000 people

Year	London	South East	South West
2000	37	5	3
2001	36	6	4
2002	42	6	6
2003	42	7	4
2004	42	7	5
2005	49	8	5
2006	44	8	3
2007	43	8	5
2008	44	8	5
2009	44	9	6
2010	42	9	5
2011	45	10	5

(i) How does the number of cases of TB for London compare with the rest of southern England?

_____

_____

_____

(1)

(ii) Describe the pattern in the data for cases of TB in the South East.

_____

_____

(1)

(iii) Describe the pattern in the data for cases of TB in the South West.

_____

_____

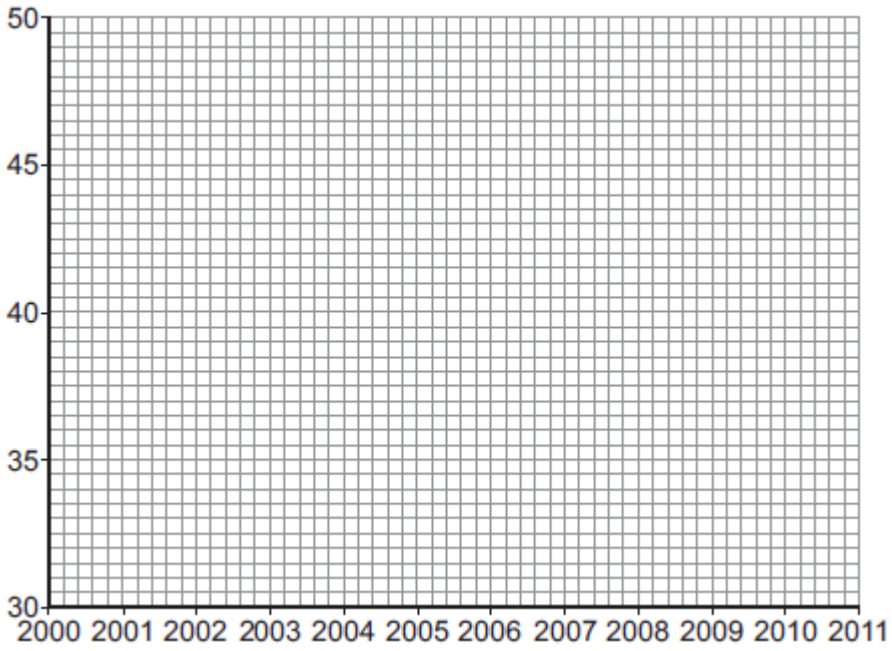
_____

_____

(2)

(c) (i) On the graph paper below:

- plot the number of cases of TB in **London**
- label both the axes on the graph
- draw a line of best fit.



(4)

(ii) Suggest why a student thought the value for 2005 in London was anomalous.

_____

_____

_____

_____

(1)

(d) People can be vaccinated against TB.

Suggest how a vaccination programme would reduce the number of people with TB.

Details of how a vaccine works are **not** required.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(Total 13 marks)

Q19.

Drugs affect the human body.

(a) Draw **one** line from each drug to the correct information about the drug.

Drug	Information
Cannabis	Used to boost heart rate
Steroid	Used to treat leprosy
Stimulant	May cause mental illness in some people
	Used to increase muscle

Thalidomide	growth
	Used to treat measles

(4)

(b) New drugs must be tested and trialled before being used.

(i) New drugs are tested in a laboratory before they are trialled on people.

What are new drugs tested on in a laboratory?

_____

(1)

(ii) Why is it important that drugs are trialled before doctors give them to patients?

Tick (✓) **two** boxes.

- To check that the drug works ☐
- To check the cost of the drug ☐
- To find out if the drug is legal ☐
- To find the best dose to use ☐

(2)

(iii) In a double blind drug trial, only some people know which patients have been given the drug.

Who knows which patients have been given the drug?

Tick (✓) **one** box.

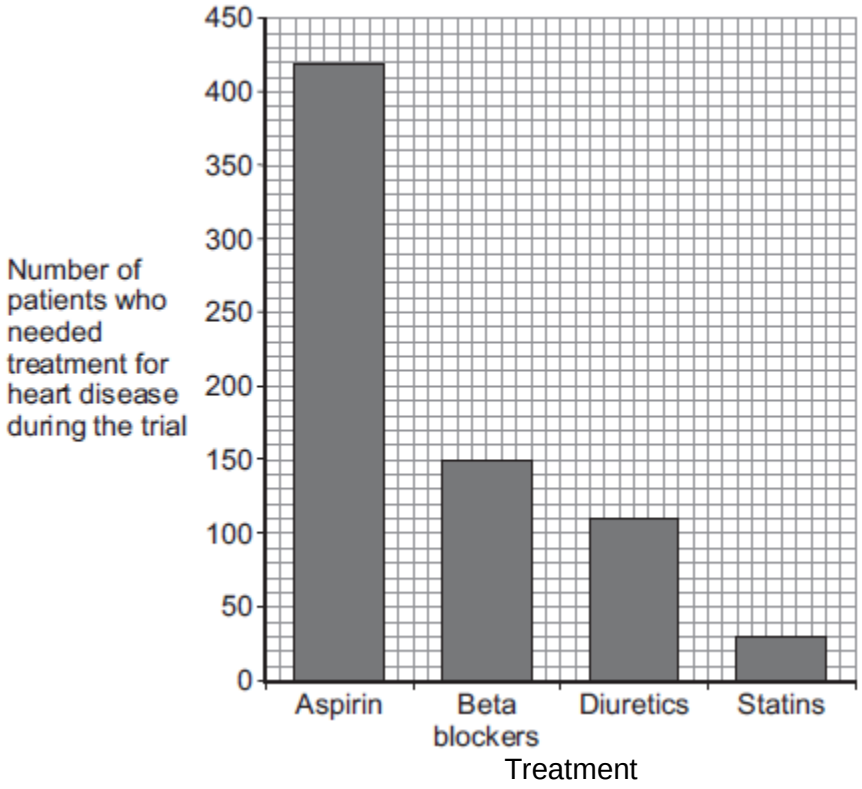
- The patient and the doctor ☐
- Only the doctor ☐

Only scientists at the drug company ☐

(1)

(c) Doctors trialled four different treatments for reducing the risk of heart disease. Each treatment was trialled on the same number of patients for 5 years. The patients did **not** have heart disease at the start of the trial.

The graph below shows the results.



(i) How many patients who took aspirin needed treatment for heart disease during the trial?

Number of patients = _____

(1)

(ii) Based **only** on the evidence in the graph, which would be the best treatment to reduce the risk of developing heart disease?

_____

(1)

(iii) Suggest **one** other factor that a doctor might consider before deciding which treatment to use for a patient.

_____

_____

(1)

(Total 11 marks)

Q20.

The MMR vaccine is used to protect against measles.

(a) Apart from measles, which **two** other diseases does the MMR vaccine protect against?

_____ and _____

(1)

(b) Read the information.

> Measles is a dangerous disease caused by a virus.
> Normally, MMR vaccinations are given at 1 year old and again at 4 years old.
> Each vaccination is 90% effective in protecting against the measles virus.
>
> In April 2013, there were 630 cases of measles in children aged 4 and over in a small area of the UK. Of these cases, 504 children had not been vaccinated against MMR at all and only a few had been given a second vaccination.

(i) Calculate the percentage of the children who caught measles in April 2013 who had **not** been vaccinated against MMR.

_____

_____

_____

_____

_____

_____

Percentage = _____

(2)

(ii) Suggest **one** advantage to the population as a whole of children having the second MMR vaccination.

_____

_____

(1)

(c) (i) What does a vaccine contain?

(1)

(ii) Explain how a vaccination prevents infection.

(3)

(d) (i) Antibiotics can only be used to treat some infections.

Explain why antibiotics **cannot** be used to treat measles.

(2)

(ii) Why do antibiotics become less useful at treating an infection if the antibiotic is overused?

_____

_____

(1)

(Total 11 marks)

Q21.

Viruses and bacteria cause diseases in humans.

(a) Draw a ring around the correct word to complete the sentence.

Organisms that cause disease are called	algae. pathogens. vaccines.

(1)

(b) In August 2011 the United Nations gave a warning that there was a new strain of the bird flu virus in China.

Bird flu may kill humans. The new strain of the bird flu virus could cause a *pandemic* very quickly.

(i) What is a *pandemic*?

Tick (✓) **one** box.

A disease affecting the people all over one country.	☐
A disease affecting hundreds of people	☐
A disease affecting people in many countries.	☐

(1)

(ii) The swine flu virus is carried by pigs.

The bird flu virus is likely to spread much more quickly than the swine flu virus.

Suggest **one** reason why.

_____

_____

(1)

This notice is from a doctor's surgery.

Unfortunately, antibiotics will NOT get rid of your flu.

(c) (i) Why will antibiotics **not** get rid of flu?

_____

_____

(1)

(ii) The symptoms of flu include a sore throat and aching muscles.

What would a doctor give to a patient to relieve the symptoms of flu?

_____

(1)

(iii) It is important that antibiotics are **not** overused.

Explain why.

Use words from the box to complete the sentence.

antibody	**bacteria**	**immune**	**resistant**	**viruses**

Overuse of antibiotics might speed up the development

of _____ strains of

_____ .

(2)

(Total 7 marks)

Q22.

A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

(a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

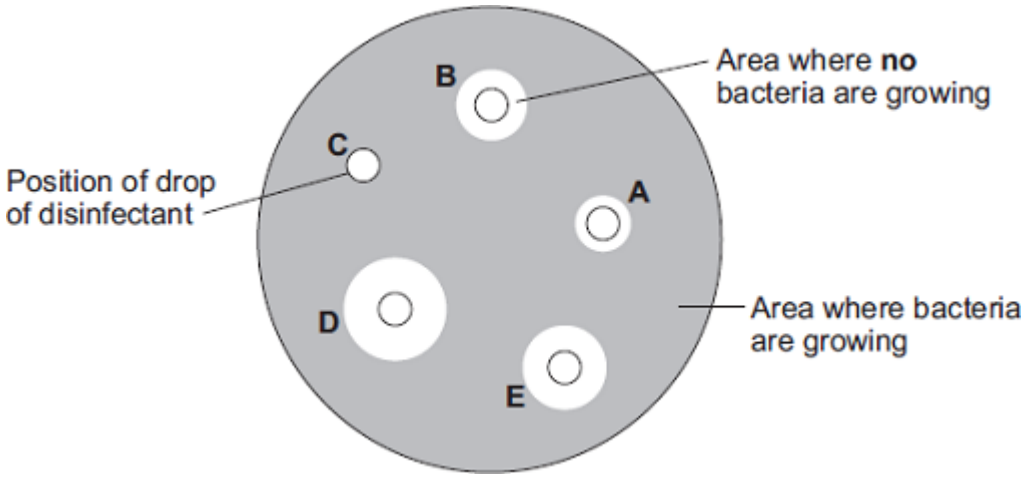
Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

(6)

(b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.



(i) There are areas on the agar jelly where **no** bacteria are growing.

Why?

_____

_____

_____

_____

(1)

(ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

_____

_____

_____

_____

_____

_____

Give **one** reason why the student might **not** be correct.

_____

_____

_____

_____

_____

_____

(2)

(Total 9 marks)

Q23.

White blood cells protect the body against pathogens such as bacteria and viruses.

(a) (i) Pathogens make us feel ill.

Give **one** reason why.

_____

_____

_____

_____

(1)

(ii) White blood cells produce antibodies. This is one way white blood cells protect us against pathogens.

Give **two** other ways that white blood cells protect us against pathogens.

1.

_____

___

_____

_____

2.

_____

___

_____

_____

(2)

(b) Vaccination can protect us from the diseases pathogens cause.

(i) One type of virus causes measles.

A doctor vaccinates a child against measles.

What does the doctor inject into the child to make the child immune to measles?

_____

_____

_____

_____

_____

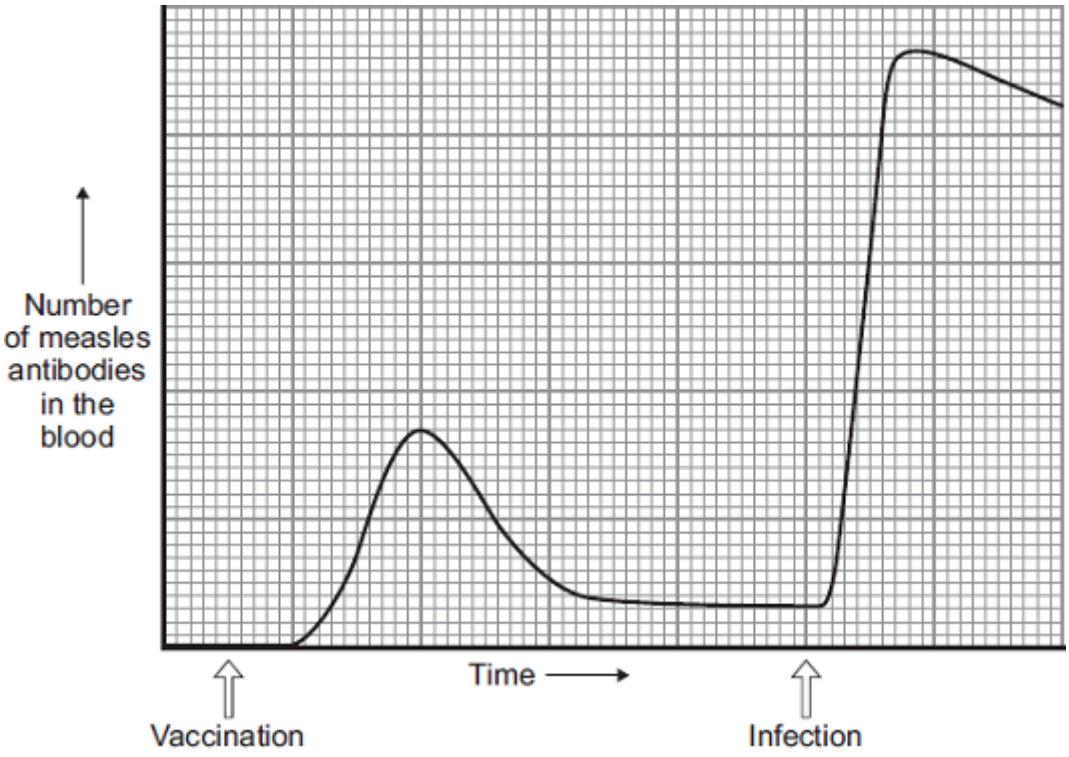
_____

_____

(2)

(ii) A few weeks after the vaccination, the child becomes infected with measles viruses from another person.

The graph shows the number of measles antibodies in the child's blood from before the vaccination until after the infection.



More measles antibodies are produced after the infection than after the vaccination.

Describe other differences in antibody production after infection compared with after vaccination.

_____

_____

_____

_____

_____

_____

_____

(3)

(iii) Vaccination against the measles virus will **not** protect the child against the rubella virus.

Why?

_____

_____

(1)

(c) What is the advantage of vaccinating a large proportion of the population against measles?

_____

_____

(1)

(Total 10 marks)

Q24.

(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 developing the harmful effect from the disease if not given the MMR vaccine**	**Risk of developing the harmful effect if given the 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)

(Total 7 marks)

Q25.

Some diseases can be cured by using antibiotics or prevented by vaccination.

(a) (i) Explain fully why antibiotics cannot be used to cure viral diseases.

(2)

(ii) There has been a large increase in the populations of many antibiotic-resistant strains of bacteria in recent years.

Explain why.

(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.

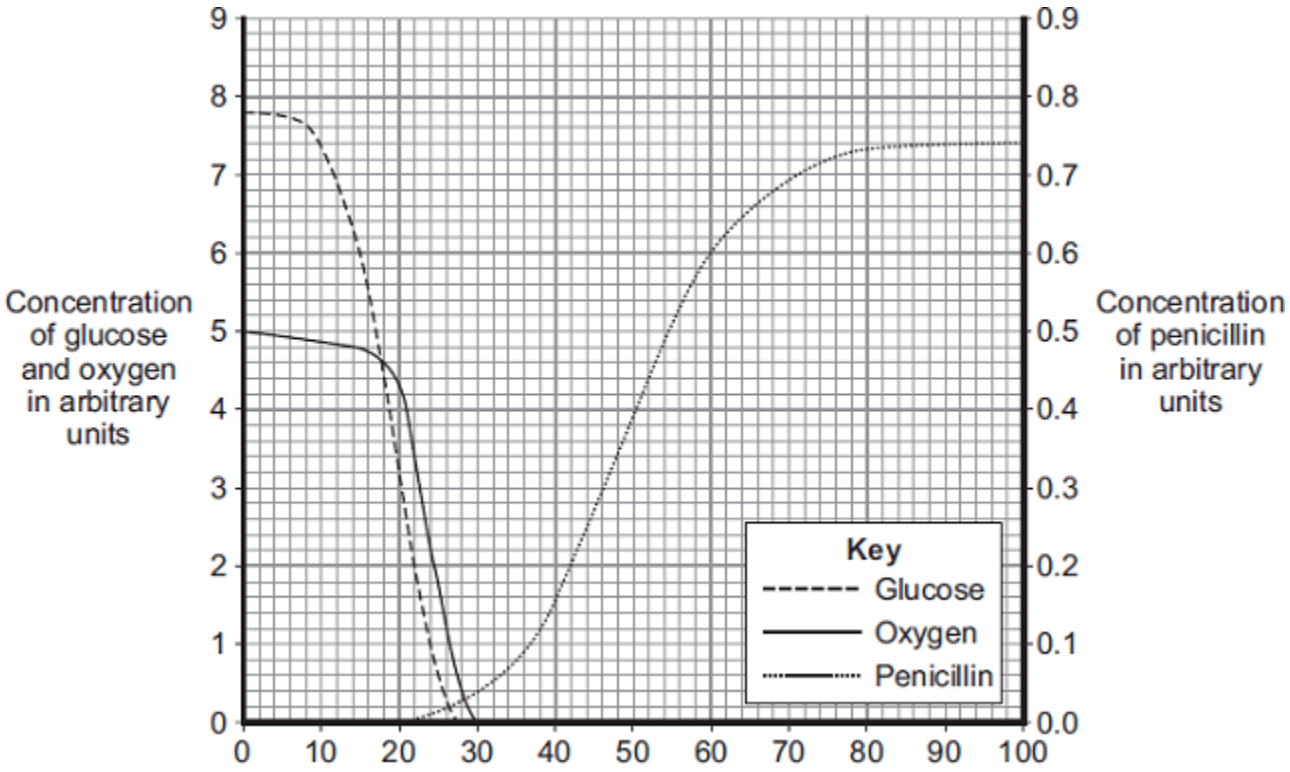
(3)

(Total 7 marks)

Q26.

The mould *Penicillium* can be grown in a fermenter. *Penicillium* produces the antibiotic
penicillin.

The graph shows changes that occurred in a fermenter during the production of penicillin.



(a) During which time period was penicillin produced most quickly?

Draw a ring around **one** answer.

0 – 20 hours **40 – 60 hours** **80 – 100 hours**

(1)

(b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(ii) How does the change in the concentration of oxygen in the fermenter compare with the change in concentration of glucose between 0 and 30 hours?

Tick (✓) **two** boxes.

The oxygen concentration changes after the glucose concentration. ☐

The oxygen concentration changes before the glucose concentration. ☐

The oxygen concentration changes less than the glucose concentration. ☐

The oxygen concentration changes more than the glucose concentration. ☐

(2)

(iii) What is the name of the process that uses glucose?

Draw a ring around **one** answer.

distillation **filtration** **respiration**

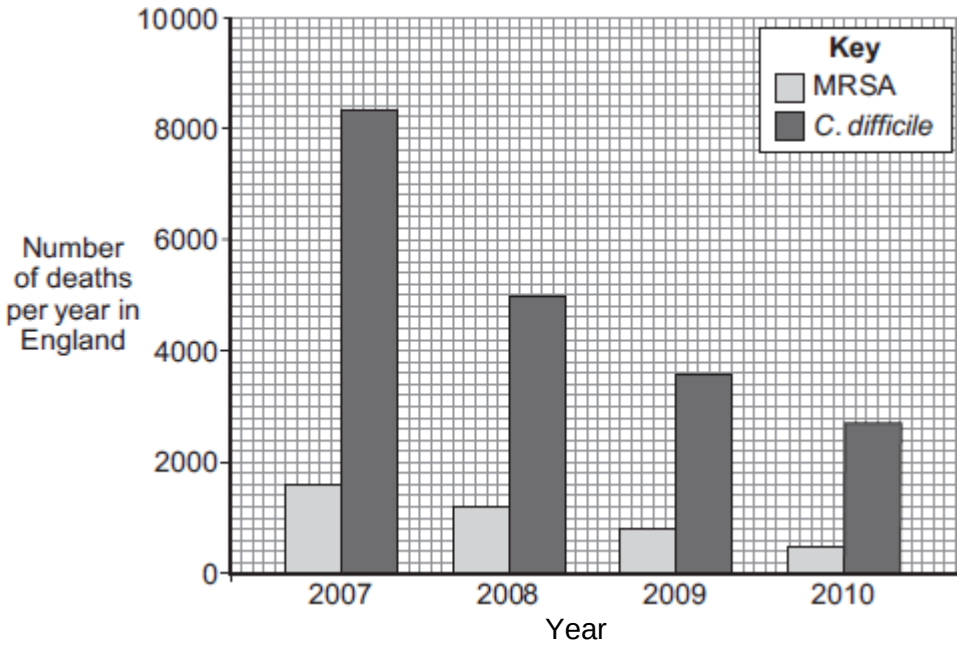
(1)

(Total 6 marks)

Q27.

Infections by antibiotic resistant bacteria cause many deaths.

The bar chart below shows information about the number of deaths per year in England from *Methicillin-resistant Staphylococcus aureus* (MRSA) and from *Clostridium difficile* (*C.difficile*) over 4 years.



(a) (i) Describe the trend for deaths caused by *C. difficile*.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(ii) Suggest a reason for the trend you have described in part **(a)(i)**.

Explain your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(iii) Calculate the percentage change in deaths caused by MRSA from 2009 to 2010.

_____

_____

_____

Percentage change in deaths caused by MRSA = _____ %

(2)

(iv) Numbers have not yet been published for 2011.

When the numbers are published, scientists do **not** expect to see such a large percentage change from 2010 to 2011 as the one you have calculated for 2009 to 2010.

Suggest **one** reason why.

_____

_____

(1)

(b) Before 2007 there was a rapid increase in the number of deaths caused by MRSA.

Describe how the overuse of the antibiotic methicillin led to this increase.

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

Q28.

Malaria is caused by the malaria parasite.

(a) Describe what happens during the *liver infection stage* of the life cycle of the malaria parasite.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Read the information about the development of a vaccine against malaria.

Scientists have removed two important genes in a malaria parasite. This malaria parasite causes the type of malaria most deadly to humans. When the genes are removed the malaria parasite stays in the liver infection phase, stopping the parasite spreading to the blood stream where the parasite can cause severe disease and death.

Scientists are using the genetically modified malaria parasites to develop a vaccine against malaria. Similar vaccines have been tested in mice and produce 100 per cent protection against malaria infection. Scientists hope that the vaccine will produce similar results in humans.

Although two genes have been removed, the parasite is alive and able to stimulate the body's protective immune system to recognise malaria parasites coming into the body. Scientists think the weakened parasites used in the vaccine will not become harmful again because the genes have been removed from the genetic material and the parasite could not recreate the gene.

Evaluate the use in humans of the new vaccine against the malaria parasite.

(3)
(Total 6 marks)

Q29.

In the 1800s, many women died from disease after giving birth.

Dr Semmelweis compared the death rates of women in two hospital wards, **Ward A** and **Ward B**.

Table 1 shows some of the results.

Table 1

Year	Percentage (%) of women who died	
	Ward A	Ward B
1834	7.7	7.4
1836	7.5	7.8
1844	8.4	2.1
1846	11.3	2.8

Before 1840
Doctors and nurses worked in **Ward A** and in **Ward B**.
The doctors often worked in other wards with patients who had diseases.
The doctors did **not** wash their hands.

After 1840

Doctors only worked in **Ward A** and **not** in **Ward B**.
Only nurses worked in **Ward B**.
The nurses did **not** work in other wards with patients who had diseases.

(a) (i) Look at the data for **Ward A** and **Ward B** after 1840.

Describe the effect on death rate of having **only** nurses working in **Ward B** and **not** doctors.

To gain full marks you must refer to the data in **Table 1**.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(ii) Suggest an explanation for the difference you described in part (a)(i).

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(b) In 1847, Dr Semmelweis told the doctors to wash their hands each time before they began to work in **Ward A**.

Table 2 shows the death rates in the two wards, after 1847.

Table 2

Year	Percentage (%) of women who died	
	Ward A	Ward B

1848	2.7	2.8
1849	2.0	1.9

Dr Semmelweis was right to tell the doctors to wash their hands.

What evidence is there to support Dr Semmelweis telling the doctors to wash their hands?

Use information from **Table 1** and **Table 2** in your answer.

(3)

(c) In modern hospitals less than 0.1% of women die from disease after giving birth.

Medical understanding has improved since the 1850s to reduce the death rate.

Other than improvements in hygiene, give **two** reasons for the low death rate from
infectious diseases in modern hospitals.

(2)
(Total 9 marks)

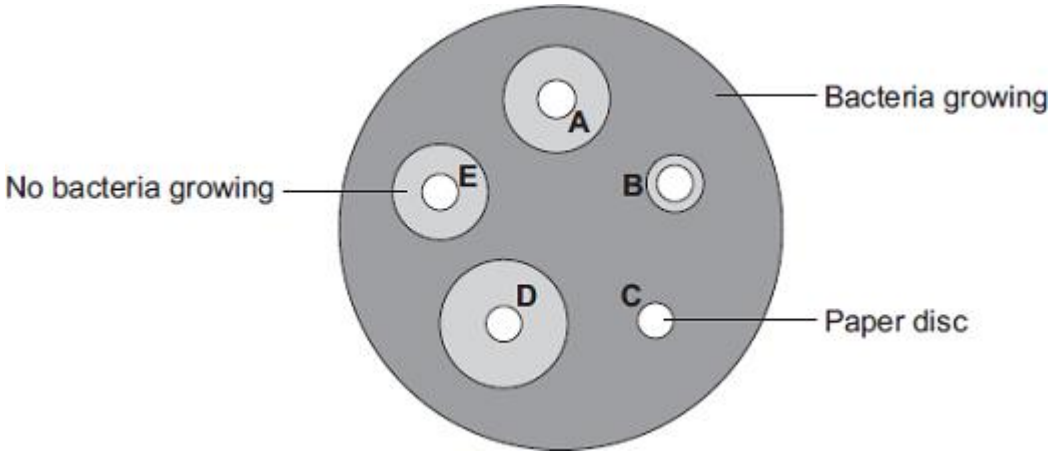
Q30.

Students in a school investigated the effect of five different antibiotics, **A**, **B**, **C**, **D** and **E**, on one type of bacterium.

The students:

- grew the bacteria on agar jelly in a Petri dish
- soaked separate paper discs in each of the antibiotics
- put the paper discs onto the bacteria in the Petri dish
- put the Petri dish into an incubator.

The diagram shows what the Petri dish looked like after 3 days.



(a) (i) What is the maximum temperature the incubator should be set at in the school?

Draw a ring around your answer.

10°C **25°C** **50°C**

(1)

(ii) Draw a ring around the correct answer to complete the sentence.

The incubator should **not** be set at a higher temperature because the higher

pathogens.

temperature might help the growth of

toxins.
viruses.

(1)

(b) Which antibiotic, **A**, **B**, **C**, **D** or **E**, would be best to treat a disease caused by this type of bacterium?

Write your answer in the box. ☐

Give the reason for your answer.

_____

_____

_____

_____

(2)

(c) Antibiotics **cannot** be used to treat diseases caused by viruses.

Why?

Tick (✓) **one** box.

Viruses are not pathogens ☐

There are too many different types of virus ☐

Viruses live inside cells ☐

(1)

(Total 5 marks)

Q31.

Nicotine is a drug in tobacco smoke. Smoking tobacco is harmful.

(a) (i) Many smokers find it difficult to stop smoking.

Complete the sentence.

It is difficult to stop smoking because nicotine is very _____ .

(1)

(ii) Nicotine affects synapses in the brain.

What is a synapse?

_____

_____

_____

_____

(1)

(b) A drug company has developed a new drug, Drug **A**, to help people stop smoking.

Doctors tested the drug in a double-blind trial with over 2000 volunteers who were smokers.

The volunteers wanted to stop smoking.

The volunteers were divided into three groups. Each volunteer took a tablet once a day for 12 weeks:

- group 1 took Drug **A**
- group 2 took Drug **B** (a drug already in use to stop people smoking)
- group 3 took a placebo.

The smoking habits of each group were recorded for a year.

(i) What is a placebo?

_____

_____

(1)

(ii) Why is a placebo group used in drug trials?

_____

_____

_____

_____

(1)

(iii) Which people knew what was in each tablet, in this trial?

Tick (✓) **one** box.

Both doctors and volunteers	☐
Doctors but not volunteers	☐
Neither doctors nor volunteers	☐

(1)

(iv) It is important that the three groups of volunteers should be similar.

Give **two** factors that should be similar in the groups of volunteers.

1. _____

2. _____

(2)

(c) The table shows the results of the trials.

Tablet	**Percentage of volunteers who had stopped smoking**	
	After 12 weeks	**After 1 year**
Drug **A**	44	23
Drug **B**	30	15
Placebo	18	10

A doctor looked at the results of the tests.

The doctor suggested that a smoker who wanted to give up smoking should use Drug **A**.

Why?

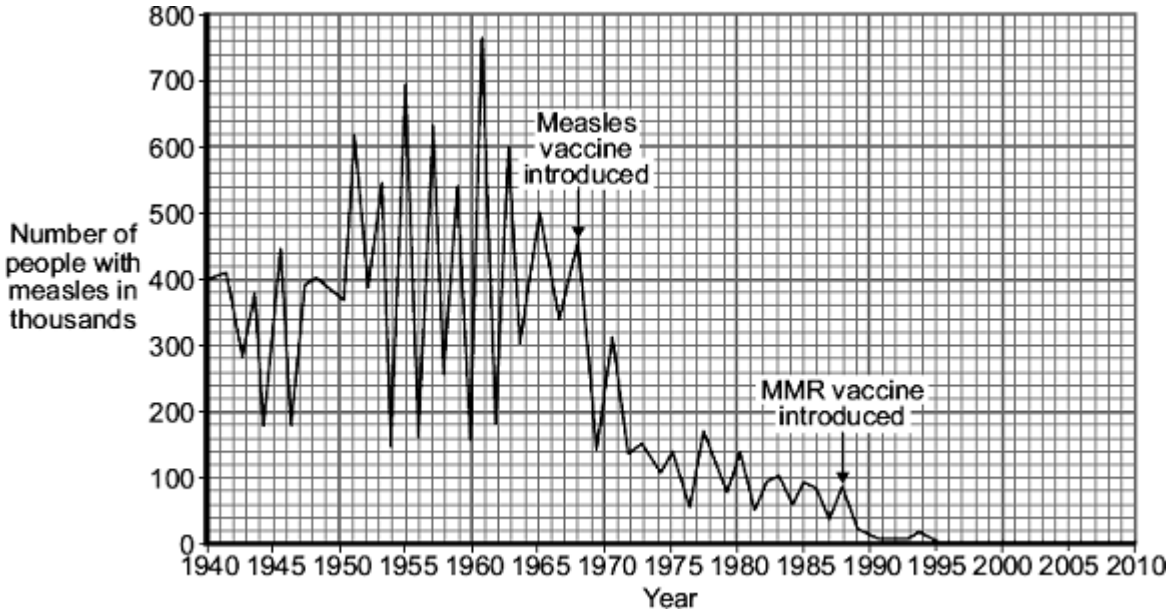
_____

(1)

(Total 8 marks)

Q32.

The graph shows the number of people with measles in the UK between 1940 and 2010.



© Health Protection Agency

(a) Compare how effective introducing the measles vaccine was with introducing the MMR vaccine.

Use data from the graph.

(3)

(b) The MMR vaccine was introduced in 1988.

Other than measles, which **two** diseases does the MMR vaccine protect against?

1.

2.

(2)

(c) To immunise someone against measles, a small quantity of the inactive measles pathogen is injected into the body.

Describe what happens in the body after immunisation to stop a person catching measles in the future.

_____

_____

(3)

(Total 8 marks)

Q33.

Drugs must be trialled before the drugs can be used on patients.

(a) (i) Before the clinical trials, drugs are tested in the laboratory.
The laboratory trials are **not** trials on people.

What is the drug tested on in these laboratory trials?

_____

_____

(1)

(ii) Drugs must be trialled before the drugs can be used on patients.

Give **three** reasons why.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Read the information about cholesterol and ways of treating high cholesterol levels.

Diet and inherited factors affect the level of cholesterol in a person's blood. Too much cholesterol may cause deposits of fat to build up in blood vessels and reduce the flow of blood. This may cause the person to have a heart attack.
Some drugs can lower the amount of cholesterol in the blood.

The body needs cholesterol. Cells use cholesterol to make new cell membranes and some hormones. The liver makes cholesterol for the body.

Some drugs can help people with high cholesterol levels.

Statins block the enzyme in the liver that is used to produce cholesterol. People will normally have to take statins for the rest of their lives. Statins can lead to muscle damage and kidney problems. Using some statins for a long time has caused high numbers of deaths.

Cholesterol blockers reduce the absorption of cholesterol from the intestine into the blood.
Cholesterol blockers can sometimes cause problems if the person is using other drugs.

Evaluate the use of the two types of drug for a person with high cholesterol levels.

_____

_____

_____

_____

_____

_____

(6)

(Total 10 marks)

Q34.

Read the article.

> Parents all over the world advise children to 'wrap up warm or you'll catch a cold'.
>
> Scientists at Cardiff University recruited 180 volunteers to take part in an investigation to find out if the advice was true. The investigation took place during the city's common cold season.
>
> Half of the volunteers put their feet in bowls of ice cold water for 20 minutes. The other volunteers sat with their feet in empty bowls.
>
> Over the next few days, almost a third of the volunteers who put their feet into cold water developed colds. Fewer than one in ten of the other volunteers developed colds.

(a) Draw a ring around the correct answer to complete the sentence.

The advice 'wrap up warm or you'll catch a cold' is an example of

- hearsay.
- a hypothesis.
- a prediction.

(1)

(b) What was the experimental control in the investigation?

_____

_____

(1)

(c) The scientists did **not** prove that the advice 'wrap up warm or you'll catch a cold' is true.

Explain why.

_____

(3)

(Total 5 marks)

Q35.

Scientists have discovered that curry spices affect sheep and cattle. Curry spices can reduce the amount of methane that grazing animals give off.

'Bad' bacteria in the animal's stomach produce methane. About 12% of the animal's food is changed into methane.

The curry spice coriander works like an antibiotic. Adding coriander to animal food reduces methane production by about 40%.

(a) (i) Why does adding coriander to an animal's food reduce methane production?

(1)

(ii) Explain **one** advantage to a farmer of adding coriander to the animal's food.

(2)

(b) Farm animals give off large amounts of methane.

Explain the effects of adding large amounts of methane to the atmosphere.

(3)

(Total 6 marks)

Mark schemes

Q1.

(a) phloem

1

(b) translocation

1

(c) either:

less (sugars for) respiration

1

(so) less energy released

1

or

less amino acids made (1)

(so) less protein produced **or** less protein synthesis (1)

or

less cellulose made (1)

(so) weaker cell walls (1)

(d) (aphids) can fly to another plant **or** part of the plant

ignore to fly unqualified

1

to get (more) food

allow to find a mate
allow idea of less competition for food
allow to escape predators
*do **not** accept escape prey*

1

(e) (oil) prevents aphids from attaching to leaf **or** causes aphids to slide off leaf

ignore 'the leaf is slippery'

or
idea that oil may harm / kill the aphid

allow oil may be unpleasant to the aphid

1

(f) (plant / stem has) thorns

allow spines / spikes / prickles
ignore stings
*do **not** accept thorns protect (the plant) from predators*

1

(g) C

if any other letter given then no marks for the question

1

(fungi / spores) blown by / in direction of the wind

allow black spot / disease is blown by / in direction of the wind

or

it's the closest plant (to A)

*do **not** accept reference to bacteria / viruses / pollen being blown*

1

(h) any **one** from:

- spread rose bushes out more

  allow isolate the infected plant
  allow idea of barrier around infected plant
  ignore separate unless qualified

- remove any infected parts of the plant

  allow remove infected plant / A

- use a fungicide

  ignore pesticide
  *do **not** accept insecticides / herbicide*

1

[11]

Q2.

(a) toxins / poisons (secreted by / from / in bacteria)

1

(b) any **two** from:

- wash hands after using toilet / being sick
  or
  wash hands before preparing / handling food
  or
  do not prepare food (whilst infected)

  ignore 'wash hands' unqualified
  ignore reference to coughing / sneezing

- isolate yourself

  allow examples of how isolation could be achieved

- disinfect clothes / surfaces

- do not share utensils / cutlery / towels

2

(c) antibiotics

allow named examples of antibiotics

1

(d) immune system is damaged / weakened **or** immune system doesn't function properly

allow immunocompromised
allow lack of / no white blood cells

1

white blood cells cannot kill bacteria / *Salmonella* (as effectively)

allow no / fewer antibodies so bacteria not killed ***or*** *less phagocytosis so bacteria not killed* ***or*** *no / fewer antitoxins to counter toxins*

1

(e) any **one** from:

- (give chickens) antibiotics
  allow (give chickens) monoclonal antibodies
- don't sell infected chickens / eggs
  allow don't sell the chickens / eggs
  ignore don't sell chickens / eggs
- keep infected chickens isolated / indoors
  allow keep the chickens indoors
  ignore keep chickens indoors
- slaughter the infected chickens
  ignore vaccination / chlorination / disinfection

1

(f) (cleaning liquid) B
and
greater reduction in number of bacteria (after cleaning) in both locations

ignore few bacteria in both locations

allow neither / both ***and*** *idea of experimental error*

1

(g) radius (of area with no bacteria growing)

allow diameter (of the area with no bacteria growing)
ignore πr^2 *unqualified*

allow idea of placing agar plate onto graph paper and counting the squares not covered with bacteria

1

(h) repeat **and** look to see if results are similar

ignore repeat unqualified

allow repeat ***and*** *look to see if results are different*

allow repeat and see if there are anomalies

ignore repeat and identify anomalies
ignore repeat and compare unqualified

1

(i) any **one** from:

- toxicity / side / health effects

  ignore harmful / dangerous
  allow reference to allergies

- effect on other types of bacteria / pathogens

  allow not tested on other types of bacteria
  ignore germs

- interaction with other cleaners
- ease of use
- dilution factor of each cleaner (vs. cost)

  ignore concentration unqualified

- time cleaner is effective for

  ignore how long the cleaner lasts for
  allow reference to odour of cleaning liquid
  ignore reference to cost unqualified
  ignore environmental effects / flammability

1

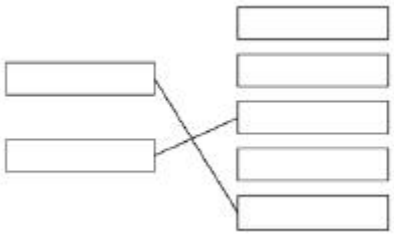
[11]

Q3.

(a) bacteria

1

(b)



extra line from a drug negates the mark for that drug

2

(c) any **one** from:

- to check they are safe
- to check they are effective

  allow to check they work or to check for the (right) dose

- to check for side effects

  allow to check for toxicity

1

(d) testing on healthy volunteers

1

(e) **Level 2 (3-4 marks):**
Relevant points (reasons / causes) are identified, and there are attempts at logical linking.

Level 1 (1-2 marks):
Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

0 marks:
No relevant content

Indicative content
- dead / inactive pathogen
- introduced to the body
- white blood cells respond
- produce antibodies
- antibodies are specific to pathogen
- antibodies produced quickly (on reinfection) / rapid response
- in larger quantities
- killing the pathogen

[9]

Q4.

(a) a fungus

1

(b) **Level 3 (5-6 marks):**
Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 2 (3-4 marks):
Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

Level 1 (1-2 marks):
Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

Level 0
No relevant content

Indicative content

	defence	**description of defence**
animals	skin	sebum / oils to kill microbes dead layer difficult to penetrate
	nose	hairs keep out dust and microbes
	trachea / bronchi	mucus traps microbes cilia moves mucus

	stomach	(hydrochloric) acid kills bacteria
	white blood cells	produces antibodies produces antitoxins engulf microbes / phagocytosis
plants	cell wall	tough / difficult to penetrate
	waxy cuticle	tough / difficult to penetrate
	dead cells / bark	fall off, taking pathogens with them
	production of antibacterial chemicals	kill bacteria
fungi	antibiotic production	kill bacteria

6

(c) any **three** from:
- sterilise agar (before use)
- sterilise (Petri) dish before use
- disinfect bench (before use)
- pass inoculating loop (through flame)
- secure lid with (adhesive) tape
- minimise exposure of agar / culture to air / lift and replace lid as quickly as possible

allow:
- *dip loop into ethanol (after flaming)*
- *keep the lid on the plate for as long as possible*
  or
  minimise exposure of agar to air
  or
  only tilt the lid off (rather than remove it)
- *flame the neck of the bottle*

3

(d) to prevent the growth of a harmful pathogen

1

[11]

Q5.

(a) any **two** from:
- regular hand washing
  or
  use hand sanitiser / alcohol gel
- cover nose / mouth when coughing / sneezing

  allow wear a face mask
- put used tissues (straight) in the bin
- don't kiss uninfected people

  allow isolate patient from others

or
don't share cutlery / cups / drinks with uninfected people
- clean / disinfect / sterilise surfaces regularly

ignore responses referring to infected people

2

(b) any **three** from:
- stimulate (mouse) lymphocytes to produce antibody

  for marking points 1 and 2 lymphocyte must be used at least once
- combine (mouse) lymphocyte with tumour cell
  or
  (create a) hybridoma
- clone (hybridoma) cell
- (hybridoma) divides rapidly **and** produces the antibody

3

(c) any **two** from:
- (monoclonal) antibody binds to virus **or** antibody binds to antigen on surface of virus
- (monoclonal) antibody is complementary (in shape) / specific to antigen (on surface of virus)
- white blood cells / phagocytes kill / engulf the virus(es)

2

(d) as a control
or
to see / compare the effects of the treatment (vs. no treatment)

1

(e) (4.8 + 10.4) ÷ 2 ÷ 100 × 1500
or
(4.8 ÷ 100 × 750) + (10.4 ÷ 100 × 750)

1

114

*an answer of 114 scores **2** marks*

*allow 228 for **1** mark*

1

(f) **(supports the conclusion because)**
over double the number / % of patients (in the trial) were hospitalised with the placebo (compared to MAB)

1

(does not support the conclusion because)
no information on patients not hospitalised / still unwell at home
or
other factors may have affected those admitted to hospital

allow correct named factor e.g. age / gender / other illness

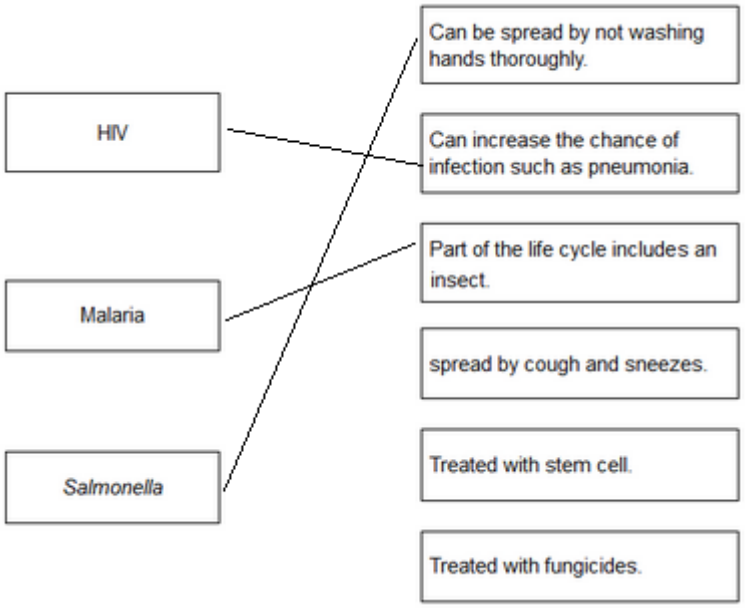
or
don't know if it was a double blind trial

1

[12]

Q6.

(a)



each extra line negates a mark

4

(b) pain when urinating

1

yellow discharge

1

(c) three correct plots

*allow **1** mark for two correct plots*

2

correctly drawn line

1

(d) any **three** from:

- (fairly) level / steady up to 2009

  *allow numbers of males fall (slightly) **and** females rise (slightly) up to 2009*
- (there is a) rise after 2009
- males are (always) higher than females
- males rising faster than females

  allow overall increase (from 2005 to 2013)

3

(e) HIV is a virus

1

(and) antibiotics are <u>only</u> effective against bacteria
or
antibiotics do not kill viruses

allow viruses live inside cells

1

[13]

Q7.

(a) to kill virus
or
to prevent virus spreading

1

(b) take (stem) cells from meristem
or
tissue culture

allow take cuttings

1

(c) use Benedict's solution

1

glucoses turns solution blue to orange

1

(d) **Level 2 (3–4 marks):**
A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points that explain why plants with TMV have stunted growth.

Level 1 (1–2 marks):
Simple statements are made, but not precisely. The logic is unclear.

0 marks:
No relevant content.

Indicative content

- less photosynthesis because of lack of chlorophyll
- therefore less glucose made
  so
- less energy released for growth
- because glucose is needed for respiration
  and / or
- therefore less amino acids / proteins / cellulose for growth
- because glucose is needed for making amino acids / proteins / cellulose

4

[8]

Q8.

(a) any **two** from:

- acid in the stomach kills pathogens in food
- skin forms a barrier / produces antimicrobial secretions
- hairs in the nose trap (particles which may contain) pathogens
- trachea / bronchi has mucus which traps pathogens
  or
  bronchi have cilia which waft mucus to throat to be swallowed

2

(b) **Level 3 (5–6 marks):**
A clear, logical and coherent answer, with no significant redundancy. The student understands the process and links this to reasons for clinical trials.

Level 2 (3–4 marks):
A partial answer with errors and ineffective reasoning or linkage.

Level 1 (1–2 marks):
One or two relevant points but little linkage of points or logical reasoning.

0 marks:
No relevant content.

Indicative content

- pre-clinical trials of the new drug on cells / tissues / live animals
- to test toxicity, dosage and efficacy
- clinical trials / test on healthy volunteers and Ebola patients at very low doses
- so that you can monitor for safety / side effects
- and only then do trials to find the optimum dosage and test for efficacy
- double blind trial / use of placebo
- which does not contain the new drug
- random allocation of Ebola patients to groups
- so no one knows who has placebo / the new drug
- peer review of data
- to help prevent false claims

6

[8]

Q9.

(a) stomach and pancreas correctly labelled

1

(b) bacteria not killed (by stomach acid / HCl) and so they damage mucus lining

1

so <u>acid / HCl</u> damages stomach tissue / causes an ulcer

allow bacteria infect stomach tissue

1

(c) if the cancer is malignant

1

(cancer) cells can spread to other organs

1

via the blood forming a secondary tumour

do not award marking points 2 or 3 without marking point 1

1

(d) add Biuret reagent to food sample

allow sodium / potassium hydroxide (solution) + copper sulfate(solution)

1

mauve / purple colour shows protein present

1

(e) damaged villi reduce surface area for absorption (of food molecules)

1

(therefore) fewer amino acids and glucose absorbed

1

with less glucose transfer of energy from respiration is reduced

1

and fewer amino acids available to build new proteins

1

[12]

Q10.

(a) vector

1

(b) any **three** from:
- destroy the snails
- isolate infected dogs
- treat infected dogs

allow vaccination
- educate owners about picking up dog faeces

3

(c) stop mosquitoes breeding

allow correct description

1

use mosquito nets

allow use of insect repellent

1

[6]

Q11.

(a) (i) small amounts of dead pathogens

1

(ii) decrease

1

by 60 (%)

allow from 70(%) to 10(%)

allow other correct data treatment

1

(b) (i) penicillin

1

(ii) any **two** from:
- antibiotics only kill bacteria

allow antibiotics do not kill viruses

- some bacteria are resistant (to antibiotics)
  allow MRSA not killed by antibiotics
- (correct) antibiotics not always used
  allow course not completed
- deficiency disease(s) not caused by bacteria **or** cannot be treated by antibiotics
- inherited disease(s) not caused by bacteria **or** cannot be treated by antibiotics
- 'lifestyle' diseases not caused by bacteria **or** cannot be treated by antibiotics
  eg heart disease / cancer

  *if no other mark given allow **1** mark for not all diseases are caused by bacteria **or** some diseases are caused by viruses*

2

(c) bacteria grow faster

allow this is body temp (at which pathogens grow)

1

[7]

Q12.

(a) 0.67(%)

allow $0.\dot{6}$ or 0.7

*allow **1** mark for evidence of* $(2 \times 10^6) \div (3 \times 10^8)$

or

*allow **1** mark for 0.0067 or 0.6*

2

(b) (i) idea that food chains start with plants / producers

*allow food chains do not start with animals **or** larvae are consumers*

1

idea that these make food (for other organisms in the chain)

*allow idea that plants / producers photosynthesise **or** plants / producers get energy from the sun*

*allow mosquito larvae do not make food / photosynthesise **or** mosquito larvae do not get energy from the sun*

1

(ii) any **four** from:

- reasoned argument for **or** against release
  must refer to at least one advantage and one disadvantage.
  *max **3** marks for either only advantages **or** only disadvantages*

advantages:

- fewer mosquitos biting **or** spreading malaria
- fewer people get / die from malaria
  allow people won't get / die from malaria
- lower medical costs (for those infected **or** for treatment) **or** less healthcare needed
- better economically for developing / tropical countries.

disadvantages:
- fewer crops reproduce
  allow fewer crops pollinated
- poorer crop yield
- possible starvation (of people)
- high cost of GM production / mosquito release
- less food for bats / birds **or** bats / birds die
  *allow disruption to food chain / ecosystem **or** reduction of biodiversity*
- gene could 'escape' into other wildlife / species
  ignore into plants

4

(iii) any **three** from:
- gene from bacteria cut out
  allow allele for gene
- ref to enzymes (anywhere in process)
  allow at any point in process, ie in cutting or in splicing
- (gene) transferred to chromosome of mosquito
  allow DNA for chromosome
- at an early stage of development
  allow egg / embryo

3

[11]

Q13.

(a) immune system

allow white blood cells / lymphocytes

ignore phagocytes

1

produces antibodies

1

(which) attack the antigens on the transplanted organ / pancreas

*allow transplanted organs have foreign antigens at start of explanation **and** linked to attacking the organ*

1

(b) (i) change / rise detected by the sensor

1

information used to calculate how much insulin she is going to need (bring her blood glucose back to normal)

1

(pump delivers) insulin into the blood

1

(causing) glucose to move into cells

allow (liver) converts glucose to glycogen

1

max 2 if no ref. to artificial pancreas

(ii) any **one** from:

- it is more accurate **or** less chance of human error
- (glucose) level will remain more stable **or** no big rises and falls in blood sugar levels
- you don't forget to test and / or inject insulin
- if ill or in coma insulin is still injected

ignore continuous and automatic unqualified

1

[8]

Q14.

(a) 55%

***2** marks for correct answer alone*

accept 54 − 56

*5.5 / 10 × 100 alone gains **1** mark*

2

(b) any **three** from:

- amino acids
- antibodies
- antitoxins
- carbon dioxide
- cholesterol
- enzymes
- fatty acid
- glucose
- glycerol
- hormones / named hormones
- ions / named ions
- proteins
- urea
- vitamins
- water.

ignore blood cells and platelets

ignore oxygen

max 1 named example of each for ions and hormones

allow minerals

3

(c) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1 – 2 marks)
There is a description of pathogens with errors or roles confused.
or
the immune response with errors or roles confused.

Level 2 (3 – 4 marks)
There is a description of pathogens **and** the immune response with some errors or confusion
or
a clear description of either pathogens **or** the immune response with few errors or little confusion.

Level 3 (5 – 6 marks)
There is a good description of pathogens **and** the immune response with very few errors or omissions.

Examples of biology points made in the response:

- bacteria and viruses are pathogens
  credit any ref to bacteria and viruses
- they reproduce rapidly inside the body
- bacteria may produce poisons / toxins (that make us feel ill)
- viruses live (and reproduce) inside cells (causing damage).

white blood cells help to defend against pathogens by:

- ingesting pathogens / bacteria / (cells containing) viruses
  credit engulf / digest / phagocytosis
- to destroy (particular) pathogen / bacteria / viruses
- producing antibodies
- to destroy particular / specific pathogens
- producing antitoxins
- to counteract toxins (released by pathogens)
  credit memory cells / correct description
- this leads to immunity from that pathogen.

6

[11]

Q15.

(a) (i) 64

1

(ii) 36
allow e.c.f from (i) i.e. 100 − answer given in (a)(i)

1

(iii) any **one** from:
- only considers 16-year-olds
  ignore lack of evidence
  allow does not refer to all ages
- only about some / 5 countries
  allow does not refer to all countries.

1

(b) the more exercise done the healthier a person is
allow the more exercise done the higher the health rating
allow the less exercise done the lower the health rating

1

(c) having a high cholesterol level

1

(d) (i) antibodies

1

(ii) antibiotics

1

[7]

Q16.

(a) leprosy

allow bone / blood cancer

ignore cancer

1

(b) (i) 6 / six

1

(ii) from 1120 to 5600

allow from 5600 to 1120

allow 4480 (alone)

1

(c) any **one** from:

ignore side effects, eg allergies

ignore safety / harm unqualified

- (test for) toxicity

  allow poisonous
- (test for) dosage

  allow idea of amount
- (test for) efficacy.

  allow to see if it works

  allow to check for interaction with other drugs

1

(d) (i) any **two** from:

ignore reference to cost / addiction

- more people take / use legal / non-prescribed drugs
- legal / non-prescribed drugs are (more) readily available
- alcohol causes liver / brain damage

  or

  tobacco causes cancer.

allow harmful effects of other named legal non-prescribed drugs

2

(ii) addiction / dependency

allow withdrawal or examples of symptoms of withdrawal (if attempting to stop)

1

[7]

Q17.

(a) microorganism / bacteria / virus / fungus that causes (infectious) disease

1

(b) reduce / stop use of (current) antibiotics

1

(reduce / stop use) for non-serious / mild / viral infections

allow ensure course is completed

allow use of variety of antibiotics

1

(c) (i) 40 °C

1

(ii) any **one** from:

- microorganisms grow / reproduce / work / act faster
- results / product acquired sooner

1

[5]

Q18.

(a) any **two** from:

- only one 'chromosome'

  allow one strand of DNA
- circular

  allow loop
- may have plasmids
- not in a nucleus / no nucleus

2

(b) (i) any **one** from:

- London is much higher

  or converse
- more variable / wider range

  allow 'on average it is 5 / 6 times greater'

1

(ii) increases

Included figures must be correct

1

(iii) overall slight increase

accept 'doesn't change much'

1

variable / goes up and down

1

(c) (i) both axes correctly labelled

x = Year

y = Number of cases

1

correct points

*all correct = **2** marks*

*1-2 errors = **1** mark*

*> 2 errors = **0** marks*

2

suitable line of best fit

accept straight line or smooth curve

1

(ii) doesn't fit the pattern / line of best fit

1

(d) provides immunity / protection (to TB)

ignore 'stops people catching it'

ignore 'resistance'

1

prevents TB <u>spreading</u>

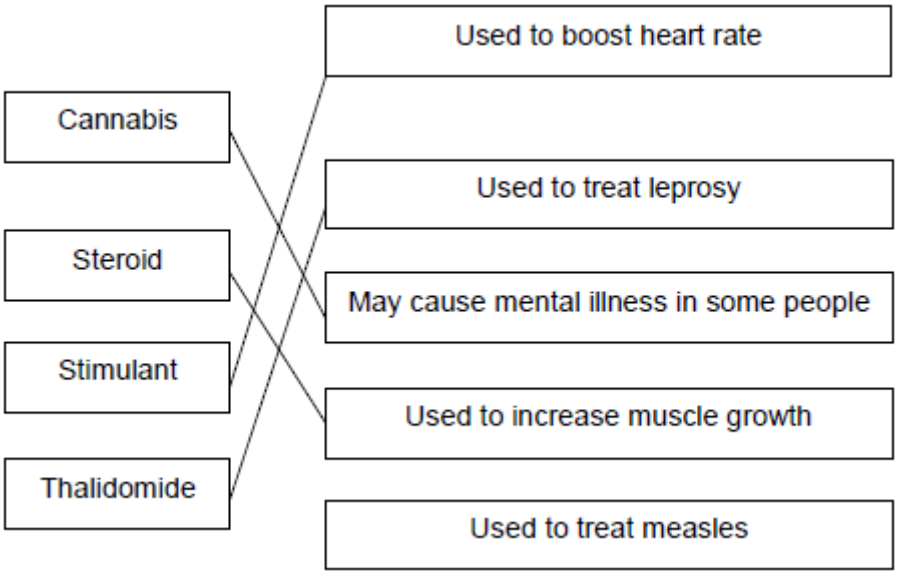
accept ref to herd immunity

1

[13]

Q19.

(a)



extra line from any drug cancels that mark

4

(b) (i) any **one** from:

- (live) animals
  accept named examples, eg mice
  ignore people / volunteers
- cells
- tissues
  *do **not** allow plants*

1

(ii) to check that the drug works

1

to find the best dose to use

1

(iii) only scientists at the drug company

1

(c) (i) 420

1

(ii) statin(s)

1

(iii) any **one** from:

- side effects
  allow cost
- other medication
  allow patient choice
- other (medical) conditions
  *allow family history **or** age*

1

[11]

Q20.

(a) mumps

in either order rubella / German measles
both needed for the mark
ignore measles unqualified

1

(b) (i) 80(.0)

*allow **1** mark for* $\frac{504}{630}$ ***or*** *0.8*

2

(ii) less chance of epidemic / pandemic

or

less chance of spread of disease / measles / mumps / rubella
allow idea of herd immunity (increased protection for those who are not vaccinated)

*ignore less chance of getting the disease **or** to eradicate the disease*

1

(c) (i) dead / inactive pathogens / viruses / bacteria

allow antigens / proteins from pathogens / viruses / bacteria

ignore microorganisms

1

(ii) white blood cells produce antibodies

1

antibodies produced rapidly (on re-infection) **or** response rapid (on re-infection)

allow ecf if antibodies incorrectly identified in first marking point

1

these antibodies kill pathogens / viruses / bacteria

*do **not** accept idea that original antibodies remain in blood and kill pathogens*

1

(d) (i) antibiotics don't kill viruses

allow antibiotics only kill bacteria

1

(because measles) virus / pathogen lives inside cells

*allow antibiotics do not work inside cells **or** killing virus / pathogen would kill / damage cell*

1

(ii) (bacteria / pathogens) develop resistance (to antibiotic)

ignore reference to immunity

ignore viruses develop resistance

1

[11]

Q21.

(a) pathogens

1

(b) (i) A disease affecting people in many countries

1

(ii) birds fly / migrate

accept converse

OR

human contact with birds more likely

birds not contained / difficult to control movement

OR

there are more birds (than pigs)

1

(c) (i) antibiotics (only) kill bacteria

ignore flu is caused by a virus unqualified

OR

antibiotics don't kill viruses

ignore virus resistant / immune

1

(ii) painkillers

accept any correct named painkiller, eg aspirin or paracetamol

allow antivirals / Tamiflu

ignore medicine / tablets

1

(iii) resistant

1

bacteria

1

in this order

[7]

Q22.

(a) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance, and apply a 'best-fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1-2 marks)
There is a brief description of at least one of the stages (pre-inoculation, inoculation, post-inoculation).

Level 2 (3-4 marks)
There is a simple description of at least two stages and an explanation of at least one of them.

Level 3 (5-6 marks)
There is a clear description of all three stages and an explanation of at least two of them.

Examples of Biology points made in the response:

Pre-inoculation

- Petri dish and agar sterilised before use

- to kill unwanted bacteria
- inoculating loop passed through flame / sterile swab
- to sterilise / kill (other) bacteria

Inoculation

- loop/swab used to spread/streak bacterium onto agar

Allow other correct methods, eg bacterial lawns

- lid of Petri dish opened as little as possible
- to prevent microbes from air entering

Post-inoculation

- sealed with tape
- to prevent microbes from air entering
- incubate
- to allow growth of bacteria

6

(b) (i) bacteria killed / destroyed

ignore fights / attacks / stops growth / got rid of

1

(ii) *Might be correct*

largest area / space where no bacteria are growing

allow most bacteria killed

1

Might not be correct

(need more evidence as) D may be harmful to people / animals / surfaces

ignore ref to cost / dangerous or harmful unqualified

1

or may work differently with different bacteria

or disinfectants may be different concentrations

ignore different amounts of disinfectant unless reference to different drop size

or may not last as long

ignore take longer to work

allow reference to anomalous result or not repeated

[9]

Q23.

(a) (i) any **one** from:

- (produce) toxins / poisons
- (cause) damage to cells
  kill / destroy cells
  allow kills white blood cells

1

(ii) produce antitoxins

1

engulf / ingest / digest pathogens / viruses / bacteria / microorganisms
accept phagocytosis or description
ignore eat / consume / absorb for engulf
ignore references to memory cells

1

(b) (i) dead / inactive / weakened
accept idea of antigen / protein

1

(measles) pathogen / virus
ignore bacteria

1

(ii) (after infection)
accept converse if clearly referring to before vaccination

1

rise begins sooner / less lag time

steeper / faster rise (in number)

1

longer lasting **or** doesn't drop so quickly
idea of staying high for longer
ignore reference to higher starting point

1

(iii) antibodies are specific or needs different antibodies
*accept antigens are different **or** white blood cells do not recognise virus*

1

(c) reduces spread of infection / less likely to get an epidemic
accept idea of eradicating measles

1

[10]

Q24.

(a) antibodies

1

antitoxins

1

antibiotics

1

(b) any **two** from:

- measles
- mumps
- rubella / German measles

2

(c) less / low / no chance of getting named or all condition(s) if vaccinated

1

quantitative figure(s) eg 5 times less likely to get convulsions

1

[7]

Q25.

(a) (i) viruses live inside cells

1

viruses inaccessible to antibiotic

allow drug / antibiotic (if used)
would (have to) kill cell

1

(ii) any **two** from eg

- non-resistant strains killed (by antibiotics)
- so less competition
- overuse of antibiotics / antibiotics prescribed for mild infections

if no marks gained allow one mark for 'people do not finish course of antibiotics'

2

(b) (stimulate) antibody production

ignore antitoxin

1

(by) white cells

1

<u>rapidly</u> produce antibody on re-infection

ignore antibodies remain in blood

1

[7]

Q26.

(a) 40 – 60 hours

1

(b) (i) decrease

1

1st slowly then faster / appropriate detail from the graph – e.g. from 7.8 to 0 / faster after 4 – 10h

1

(ii) oxygen after glucose

extra box ticked cancels 1 mark

1

oxygen less than glucose

1

(iii) respiration

1

[6]

Q27.

(a) (i) decrease

1

rate of decrease slows

1

(ii) any **one** from:

- more use of disinfectant

  allow any reasonable increase in hygiene or sterilisation precautions
- more use of hand washing
- more careful / more often cleaning of patient facilities
- raised awareness / education about hygiene

1

Explanation:
stops / reduces the bacteria being transferred / spreading

1

(iii) 800 – 500 / 800 × 100 =

1

37.5 (%)

*correct answer with or without working gains **2** marks*

1

(iv) any **one** from:

- numbers quite low now so hard to reduce further
- was a big campaign / much publicity (in 2009) so more people already doing it
- hygiene / cleaning now good so hard to improve

- hospitals short of money so less staff to clean

1

(b) mutation occurred giving resistance (to methicillin)

*do **not** accept overuse caused mutation*

1

resistant bacteria not able to be treated / not killed

1

these bacteria multiplied / reproduced / spread quickly

1

[10]

Q28.

(a) sporozoites (from mosquito saliva) divide / multiply / reproduce

ignore schizonts
*do **not** accept sexual reproduction*

1

become thousands / many (of merozoites)

1

merozoites released (from liver) into blood / red blood cells

1

(b) any **three** from:

*answer must include at least one pro **and** one con for full marks*

- reduces incidence of disease **= pro**
- success in mice indicates likely success in humans **= pro**

  accept stops people getting malaria
- but success in mice does not ensure success in humans **or** needs to be trialled in humans
  or need to check for side effects **= con**
- removal of genes should prevent parasite multiplying in liver **or** release of parasites into blood **= pro**

  allow you should not get malaria / the disease from these parasites
- the injected parasite stimulates antibody production **= pro**
- but still possible danger since living parasite injected into human **= con**
- possible liver damage **= con**

3

[6]

Q29.

(a) (i) lower percentage (of women) who died

allow fewer (women) died

1

numerical reference to a pair of figures to show this

allow any difference in a pair of figures

1

(ii) doctors were not transferring

ignore reference to nurses

1

pathogens / bacteria / viruses / microorganisms / microbes

allow fungi

ignore disease / germs / infection

1

(b) any **three** from:

- lower percentage of patients died (when doctors washed hands or in ward A)

  allow fewer for lower percentage

- large decrease or reference to proportional decrease

  ignore raw data

- little / no difference / similar to ward B

- continued drop (in ward A)

3

(c) any **two** from:

- better understanding / knowledge of immunity

  accept ref to immunisation / vaccination

- better / new drugs

  accept examples, e.g. antibiotics / penicillin (discovered)

  allow better / new medicines

- sterilisation of equipment **or** isolation of patients **or** some infectious diseases wiped out **or** earlier identification / treatment of infections

  ignore references to general hygiene

2

[9]

Q30.

(a) (i) 25°C

1

(ii) pathogens

1

(b) **D**

1

more / most bacteria killed

accept biggest area / ring where no bacteria are growing

1

(c) viruses live inside cells

1

[5]

Q31.

(a) (i) addictive

allow addicting / addict / addicted / addiction or similar

allow phonetic spelling

*do **not** accept / additive / addition*

1

(ii) junction / gap / space between neurones

allow nerve cells / nerves for neurones

allow idea where neurones / nerve cells / nerves meet / join

1

(b) (i) tablet with no drug

accept answers that convey this idea eg fake / dummy / sugar pill

allow injection with no drug

ignore drugs that don't work.

1

(ii) for comparison

accept to see if drug / it works

*allow to see psychological effect **or** make sure, it is not all in the mind*

allow as a control

ignore 'to make test fair / unbiased'

1

(iii) Neither doctors nor volunteers

1

(iv) any **two** from:

- age (range)
- sex / gender (mix)
- previous smoking habits **or** eg number smoked (before trial) **or** length of time smoked
- number in the group
- other drugs being taken **or** general health **or** height / weight / BMI / lifestyle / fitness

ignore factors already controlled

*ignore reference to all smokers **or** all want to give up*

2

(c) higher percentage / number of smokers who had stopped smoking (than Drug B)

answers must refer to data and be comparative
allow best results / most effective
ignore best drug unqualified
ignore references to 12 weeks / 1 year

1

[8]

Q32.

(a) both lead to reduction / fall (in measles cases)

can be implied

1

measles vaccine caused a big drop **or** correct use of figures

1

MMR wipes out measles **or** drops to (almost) zero **or** doesn't fall as much as measles vaccine **or** correct use of figures.

1

(b) mump(s)

1

rubella / german measles

either order
allow phonetic spelling

1

(c) white blood cells

allow lymphocytes / leucocytes
ignore memory cells

1

(wbc) produce antibodies

ignore antitoxins / antigens / antibiotics / engulfing

1

in future / if re-infected antibody production rapid / fast(er) / quick(er)

allow ecf from antitoxins / antigens / antibiotics
ignore engulfing
ignore reference to specificity

1

[8]

Q33.

(a) (i) any **one** from:

- cells
- tissues

- (live) animals / named
  allow mammals

1

(ii) any **three** from:

(to test for)

- toxicity / check not poisonous / not harmful
  allow side-effect
  allow converse
- interaction with other drugs
- efficacy **or** to see if they work **or** check if they treat the disease
  allow converse
- dosage **or** how much is needed

3

(b) **argued evaluation**

*comparison can be written anywhere in evaluation allow use of 'only' for implied comparison for each point eg **only** statins damage muscles / kidneys / organs*

any **six** from:

- statin can damage / muscles / kidneys / organs but cholesterol blockers don't
  ignore liver
  *if neither of the first 2 points are given accept for **1** mark*
- statins can cause death but cholesterol blockers don't
  *statins are more dangerous than cholesterol blockers **or** statins have more side effects*
- cholesterol blockers can interfere with action of other drugs but statins don't
- statins are for a life time but cholesterol blockers are not
- statins (might) reduce cholesterol to zero but cholesterol blockers only reduce it **or** statins reduce cholesterol more
  allow statins (might) stop membrane / hormone production but cholesterol blockers don't
- statins better for people with inherited high cholesterol
- cholesterol blockers better for people with dietary cholesterol problems
- taking/using statins/cholesterol blockers is better than dying from heart attack or build up of fat in blood vessels or reduced blood flow

6

[10]

Q34.

(a) hearsay

1

(b) (volunteers with feet in) empty bowls

accept bowl with no (iced) water

*do **not** accept mention of bowl with iced water*

1

(c) any **three** from:

ignore control variables, eg age, gender

- only some of those whose feet were in cold water caught colds
- some controls caught colds
- only feet were cold in experimental group

  allow (control) not wrapped up warm
- only kept feet in cold water for 20 minutes
- insufficient evidence for 'proof' / only showed increased risk

  allow small sample size
- don't know activities of individuals before / after the investigation (eg exposure to cold virus) / reference to immune system

  allow investigation done in 'cold season'

3

[5]

Q35.

(a) (i) kills / gets rid of / reduces methane bacteria

allow kills / gets rid of / reduces bad bacteria

ignore acts like antibiotic

1

(ii) less food converted to methane

allow can keep more cattle without further environmental damage

ignore energy

1

more growth / meat / muscle / milk produced / more profit / fatter animals

ignore references to bacteria and disease

1

(b) absorbs energy / heat radiated by Earth

allow absorbs / traps energy / heat / from Earth

*do **not** allow absorbs energy / heat from Sun*

1

some energy / heat reradiated

ignore reflected
*do **not** allow reradiates energy / heat from Sun*

1

leading to global warming / enhanced greenhouse effect
accept effects of global warming eg melting ice caps
accept methane is a greenhouse gas
ignore references to ozone

1

[6]

Q1.

(a) Explain how vaccination makes a person immune to a disease.

(4)

(b) Scientists are trialling a 'nicotine vaccine' that might help **wean smokers off** the drug nicotine.
The trials so far have produced very mixed results.
Nicotine molecules are very small and can get through the protective layers around the brain.

(i) How does nicotine cause a person to become addicted?

(1)

(ii) The 'nicotine vaccine' is made by attaching proteins to nicotine molecules.
After 'vaccination' the body reacts to the nicotine in the same way as it reacts to pathogens.

Suggest how the 'nicotine vaccine' might help wean a smoker off nicotine.

_____

_____

_____

_____

(2)

(Total 7 marks)

Q2.

Scientists at a drug company developed a new pain-killing drug, drug **X**.

(a) Painkillers do **not** cure infectious diseases.

Why?

_____

(1)

(b) The scientists compared drug **X** with two other pain-killing drugs, drug **A** and drug **B**.
In their investigation the scientists:

- chose 600 volunteers. The volunteers were all in pain
- gave 200 of the volunteers a standard dose of drug **A**
- gave 200 of the volunteers a standard dose of drug **B**
- gave 200 of the volunteers a standard dose of drug **X**.

Over the next seven hours the volunteers recorded how much pain they felt.

To get valid results the three groups of volunteers should be matched for as many factors as possible.

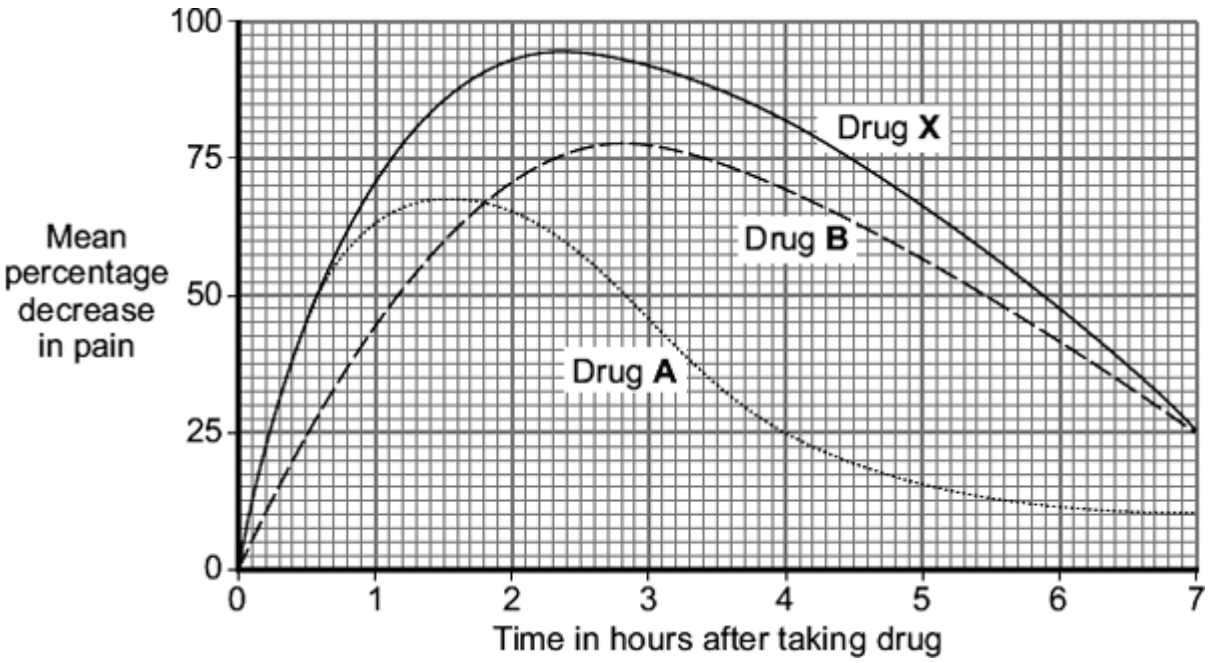
Suggest **two** of the factors that should be matched.

_____

_____

(2)

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



(i) How much pain did the volunteers still feel, four hours after taking drug **A**?

_____ percent

(1)

(ii) Give **one** advantage of taking drug **A** and **not** drug **B**.

_____

_____

(1)

(iii) Give **two** advantages of taking drug **B** and **not** drug **A**.

_____

_____

_____

_____

(2)

(d) Drug **X** is much more expensive than both drug **A** and drug **B**.

A pharmacist advised a customer that it would be just as good to take drug **A** and drug **B** together instead of drug **X**.

Do you agree with the pharmacist's advice?

Give reasons for your answer.

_____

(3)

(Total 10 marks)

Q3.

People may be immunised against diseases using vaccines.

(a) (i) Which part of the vaccine stimulates the body's defence system?

(2)

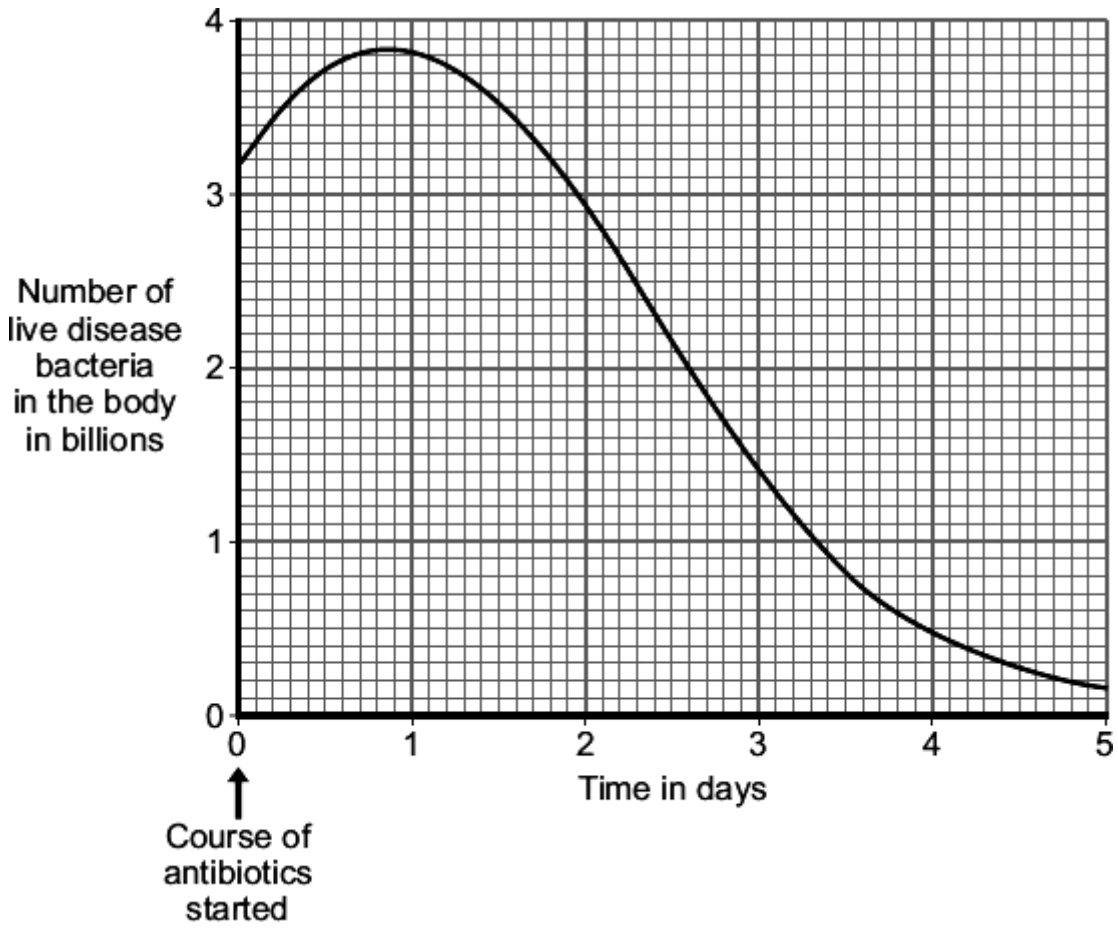
(ii) A person has been vaccinated against measles. The person comes in contact with the measles pathogen. The person does **not** catch measles.

Explain why.

(3)

(b) A man catches a disease. The man has **not** been immunised against this disease. A doctor gives the man a course of antibiotics.

The graph shows how the number of live disease bacteria in the body changes when the man is taking the antibiotics.



(i) Four days after starting the course of antibiotics the man feels well again.
It is important that the man does **not** stop taking the antibiotics.

Explain why.

Use information from the graph.

_____

_____

_____

_____

(2)

(ii) Occasionally a new, resistant strain of a pathogen appears.

The new strain may spread rapidly.

Explain why.

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

Q4.

(a) **List A** gives the names of three substances. The substances can help ill people.

List B gives information about the three substances.

Draw a line from each substance in **List A** to the correct information in **List B**.

List A **Substance**	**List B** **Information**
	White blood cells produce this substance
Antibiotic	
	This substance is used to kill bacteria
Antitoxin	
	This substance lowers blood cholesterol levels
Painkiller	
	This substance relieves only the symptoms of a disease

(3)

(b) Complete the sentences.

A vaccine contains an _____ form of a pathogen.

(1)

The MMR vaccine protects children against measles,

mumps and _____

(1)

(Total 5 marks)

Q5.

Obesity is linked to several diseases.

(a) Name **two** diseases linked to obesity.

1. _____

2. _____

(2)

(b) Scientists trialled a new slimming drug.

The table shows their results after one year.

Percentage change in mass of each volunteer	Number of volunteers
gained mass or lost 0 to 3.9 %	1900
lost 4.0 to 4.9 %	1100
lost 5.0 to 9.9 %	1500
lost 10 % or more	1500

(i) Calculate the proportion of the volunteers who lost 10 % or more of their mass.

You should first calculate the total number of volunteers, then work out the proportion.

_____

_____

Proportion of volunteers = _____

(2)

(ii) The National Health Service (NHS) gave permission for the drug to be used.

Use information from the table to suggest a reason why the NHS gave permission for the drug to be used.

_____

(1)

(Total 5 marks)

Q6.

(a) **List A** gives the names of three stages in trialling a new drug.

List B gives information about the three stages.

Draw a line from each stage in **List A** to the correct information in **List B**.

List A Stage	**List B Information**
	Used to find if the drug is toxic
Tests on humans including a placebo	
	The first stage in the clinical trials of the drug
Tests on humans using very small quantities of the drug	
	Used to find the optimum dose of the drug
Tests on animals	
	Used to prove that the drug is effective on humans

(3)

(b) Read the passage.

Daily coffee dose delays development of Alzheimer's in humans.

Alzheimer's is a brain disease that causes memory loss in elderly people. Scientists studied 56 mice that had been genetically engineered to develop Alzheimer's.

Before treatment all the mice did badly in memory tests.

Half the mice were given a daily dose of caffeine in their drinking water. The dose was equivalent to the amount of caffeine in six cups of coffee for a human.

The other mice were given ordinary water.

After two months, the caffeine-drinking mice did better in memory tests than the mice drinking ordinary water.

The headline for the passage is not justified.

Explain why as fully as possible.

(3)

(Total 6 marks)

Q7.

Many strains of bacteria have developed resistance to antibiotics.

The table shows the number of people infected with a resistant strain of one species of bacterium in the UK.

Year	2004	2005	2006	2007	2008
Number of people infected with the resistant strain	3499	3553	3767	3809	4131

(a) Calculate the percentage increase in the number of people infected with the resistant strain between 2004 and 2008.

Show clearly how you work out your answer.

Percentage increase = _____

(2)

(b) Explain, in terms of natural selection, why the number of people infected with the resistant strain of the bacterium is increasing.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

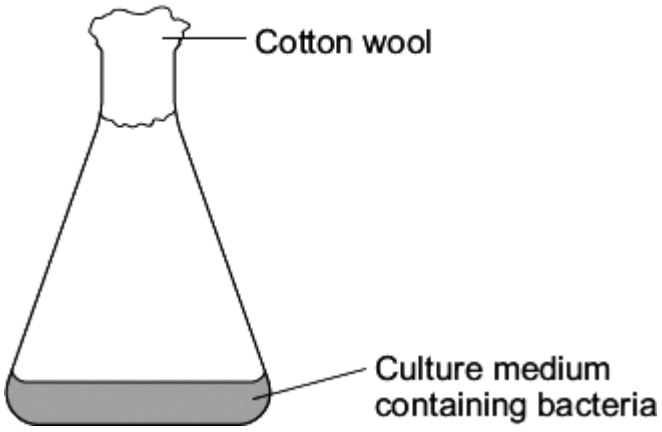
(Total 5 marks)

Q8.

Some students grew one species of bacterium in a flask.

Diagram 1 shows the flask.

Diagram 1



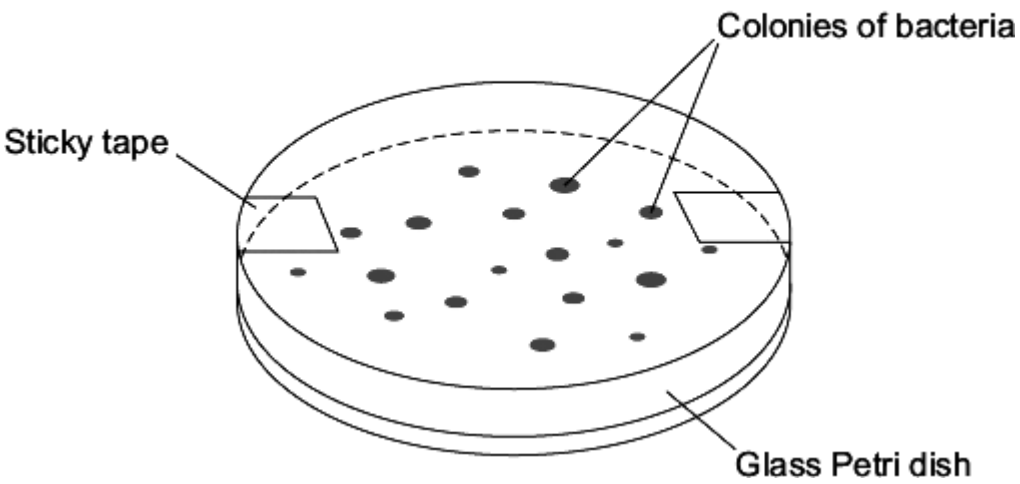
The students wanted to find the number of bacteria in 1 cm^3 of the culture medium.

The students:

- diluted 1 cm^3 of the culture medium from the flask with 999 cm^3 of water
- added 1 cm^3 of diluted culture to sterilised nutrient agar in a Petri dish
- placed the Petri dish in an incubator at 25 °C.

Diagram 2 shows the Petri dish after 3 days in the incubator.

Diagram 2



(a) Each colony of bacteria is formed where one bacterium landed on the agar jelly.

How is each colony formed?

_____

_____

(1)

(b) Complete the following calculation to find how many bacteria there were in 1 cm^3 of the undiluted culture.

Number of colonies of bacteria in the Petri dish = _____

These colonies were formed from 1 cm^3 of the culture diluted × 1000.

Therefore, number of bacteria in 1 cm^3 of undiluted culture = _____

(2)

(c) It is important to sterilise the culture medium and all the apparatus before use.

Explain why.

_____

_____

_____

_____

(2)

(d) The bacteria would grow faster at 35 °C. In a school laboratory, the Petri dish should **not** be incubated at a temperature higher than 25 °C.

Why?

_____

_____

(1)

(e) The students decided to repeat their investigation.

Why?

_____

_____

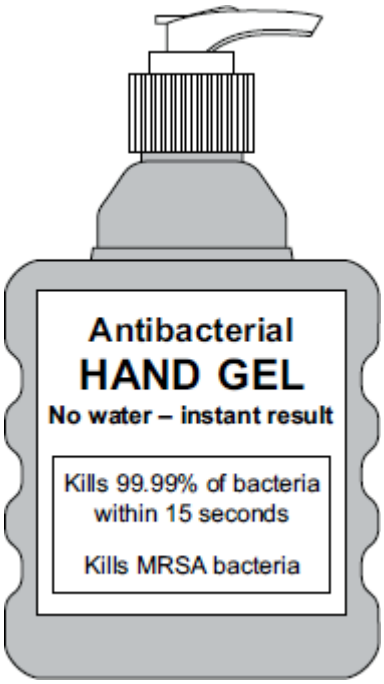
(1)

(Total 7 marks)

Q9.

MRSA strains of bacteria are causing problems in many hospitals.

(a) The diagram shows a hand-gel dispenser.



Hand-gel dispensers are now placed at the entrance of most hospital wards.

Explain why.

_____

_____

_____

_____

(2)

(b) Explain, as fully as you can, how MRSA strains of bacteria became difficult to treat.

_____

_____

_____

_____

_____

_____

(3)

(Total 5 marks)

Q10.

Scientists have trialled a new statin called rosuvastatin.

- 17 802 people took part in the trial.
- All of these people had high levels of a protein called CRP in their blood.
- The higher the level of CRP in the blood, the higher the risk of a heart attack.
- None of these people had heart conditions at the beginning of the investigation.
- None of these people had high LDL (low density lipoprotein) levels.
- All of these people were aged 50 or above.
- Half the people were given a rosuvastatin tablet each day; the other half were given a placebo.
- The trial was stopped 7 months early when it was found that the people given rosuvastatin were 54% less likely to have a heart attack than people given the placebo.

(a) Give **two** control variables in this investigation.

1. _____

2. _____

(2)

(b) What would the placebo be in this investigation?

_____

_____

(1)

(c) The trial gave reliable results.

Give **one** reason why.

_____

_____

(1)

(d) The trial was stopped 7 months early.

Give **one** reason why.

_____

_____

(1)

(e) The manufacturers of rosuvastatin paid for the trial.

However, the manufacturers took no part in the trial.

Suggest **one** reason why the manufacturers did not take part in the trial.

_____

_____

(1)

(f) The table shows some of the results of the trial.

Substance	**Concentration in blood in mg per 100 cm^3 after 3 years of trial**	
	People given rosuvastatin	People given placebo
LDL cholesterol	53	106
HDL cholesterol	50	49
Saturated fats	106	123

Rosuvastatin reduces the risk of heart attacks.

Use the data in the table to explain why.

_____

_____

_____

_____

(2)

(Total 8 marks)

Q11.

The body's immune system protects us from diseases.

Describe the different ways in which white blood cells protect us from infectious diseases.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(Total 4 marks)

Q12.

Vaccines protect us against diseases.

(a) Against which **three** diseases does the MMR vaccine protect us?

Tick (✓) **three** boxes.

Malaria ☐

Measles ☐

Meningitis ☐

Mumps ☐

Rabies ☐

Rubella ☐

(3)

(b) Draw a ring around the correct word to complete the sentence.

Vaccines cause white blood cells to produce

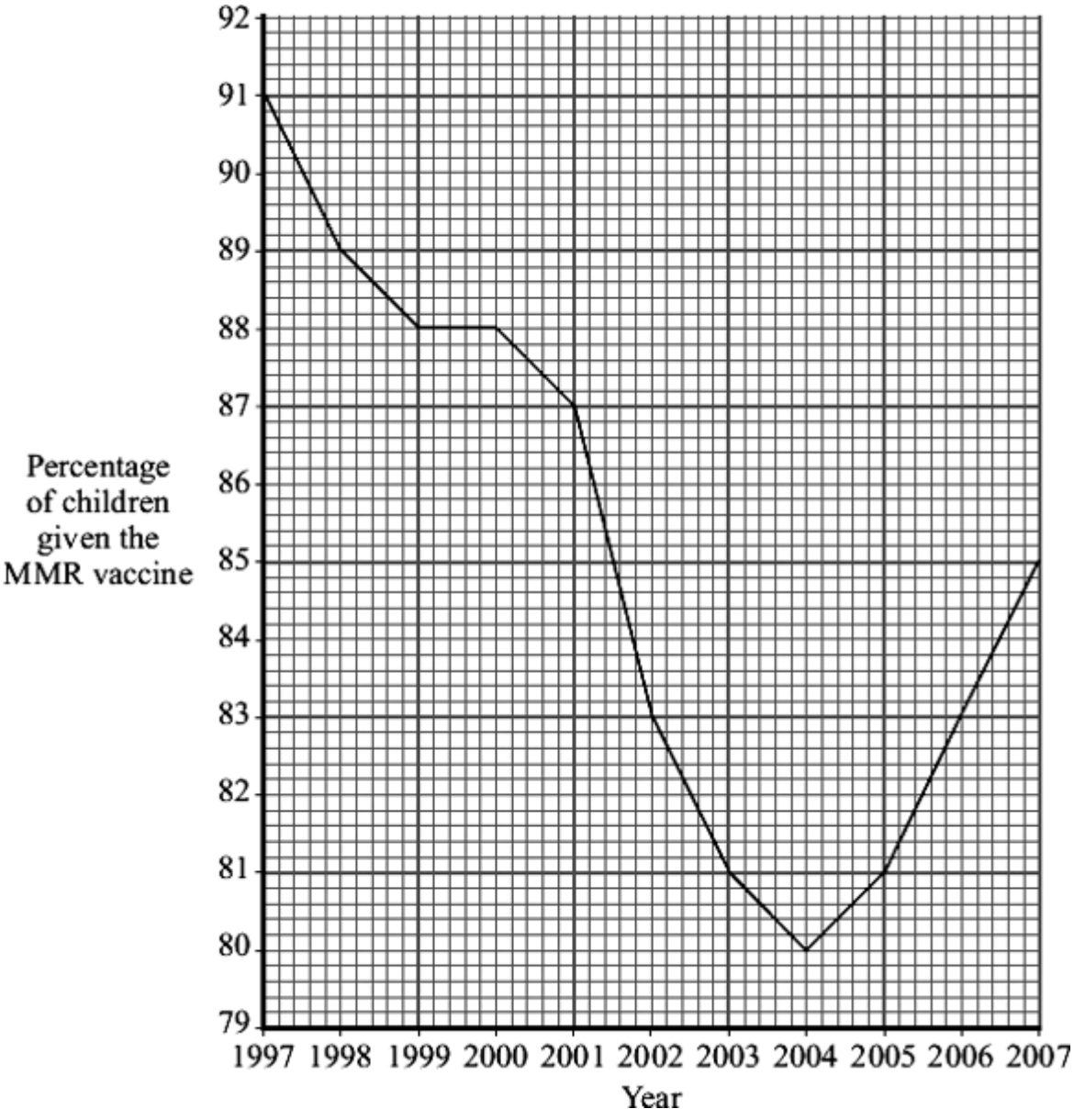
antibodies.

cholesterol.

penicillin.

(1)

The graph shows the percentage of children given the MMR vaccine in the UK between 1997 and 2007.



(c) (i) Describe the pattern shown by the data on the graph.

_____

_____

_____

_____

(2)

(ii) Suggest **one** explanation for the change in the percentage of children given the MMR vaccine between 1997 and 2004.

_____

_____

(1)

(Total 7 marks)

Q13.

Medicinal drugs are used to treat diseases.

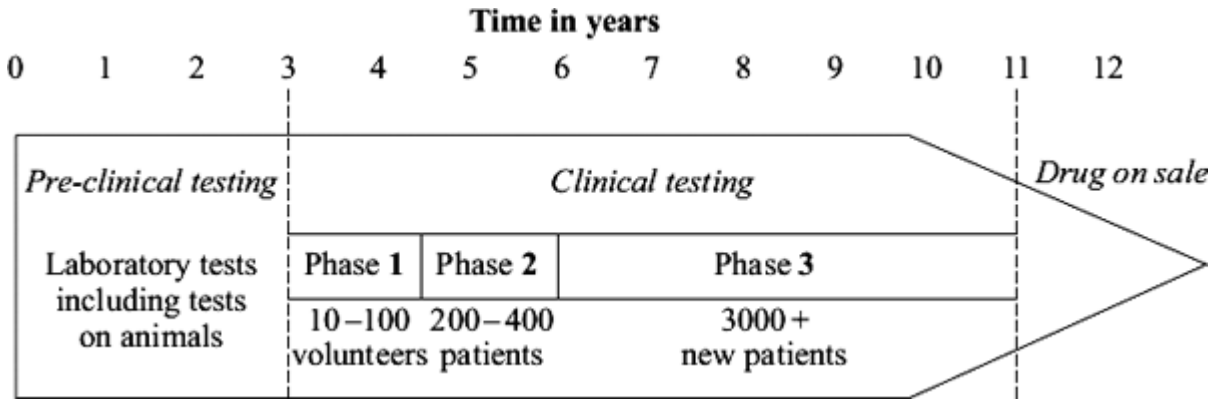
(a) Draw **one** line from each drug to its correct use.

Drug	Use
	Used as a fertility drug
Painkiller	
	Used to relieve disease symptoms
Statin	
	Used to treat leprosy
Thalidomide	
	Used to lower blood cholesterol

(3)

(b) New drugs need to be tested before going on sale.

The diagram shows a time line for the testing of a new drug.



(i) How long do trials on humans take? _____ years

(1)

(ii) What is the minimum number of humans the drug is tested on throughout *clinical testing?*

_____

(1)

(c) Draw a ring around the correct answer to complete each sentence.

(i) A new drug is first tested in the laboratory to find

if it is toxic.
if it is cost effective.
the optimum dose.

(1)

(ii) The drug is then tested on a few volunteers to find

if it is cost effective.
if it has side effects.
the optimum dose.

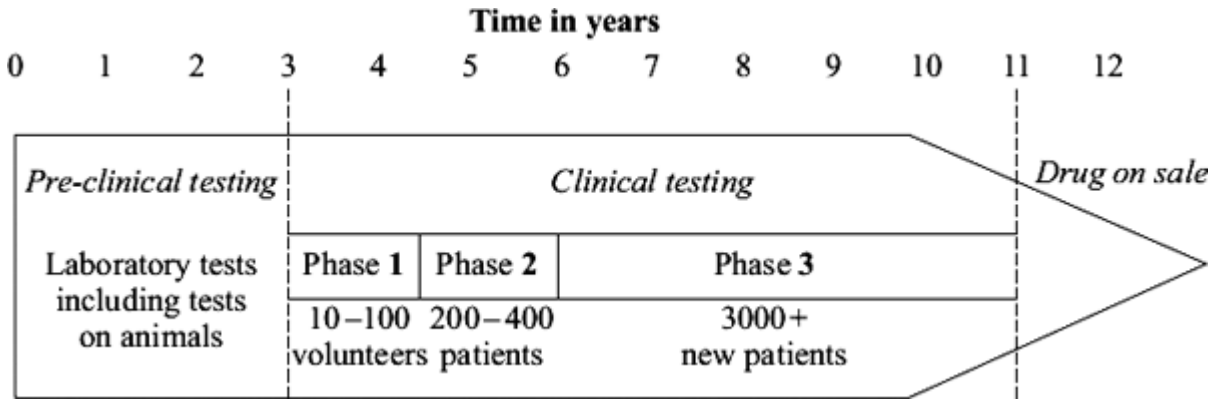
(1)

(Total 7 marks)

Q14.

New drugs have to be thoroughly tested before they are sold.

The diagram shows a time line for the testing of a new drug.



(a) What is the main purpose of *pre-clinical testing?*

_____

_____

(1)

(b) In Phase **1** of the *clinical testing,* very low doses of the new drug are used on a small number of volunteers.

(i) What is the main purpose of Phase **1** testing?

_____

_____

(1)

(ii) In Phase **1** testing, healthy volunteers are used rather than patients.

Suggest **one** reason for this.

_____

_____

(1)

(c) What is the main purpose of the Phase **2** and Phase **3** testing?

_____

_____

(1)

(d) During Phase **3** testing, many of the patients are given a *placebo.*

(i) What is meant by a *placebo?*

_____

_____

(1)

(ii) During the testing, who knows which patients are receiving the *placebo?*

Tick (✓) **one** box.

Only the patients ☐

Only the doctors ☐

Both patients and doctors ☐

Neither patients nor doctors ☐

(1)

(Total 6 marks)

Q15.

Influenza is caused by a virus.

(a) How do viruses cause illness?

_____

_____

(1)

(b) A British company making a reality television show in the Peruvian Amazon has been accused of starting an influenza epidemic. This epidemic allegedly killed four members of a remote Indian tribe and left others seriously ill.

The members of the television crew did not show symptoms of influenza, but members of the Indian tribe died from the disease.

Suggest an explanation for this.

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 4 marks)

Q16.

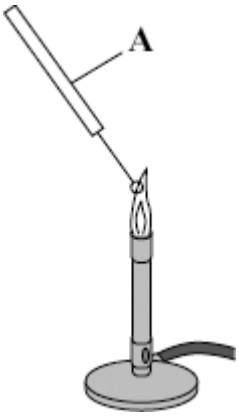
(a) It is important to prevent contamination when growing microorganisms.

The diagram shows the transfer and culturing of microorganisms.

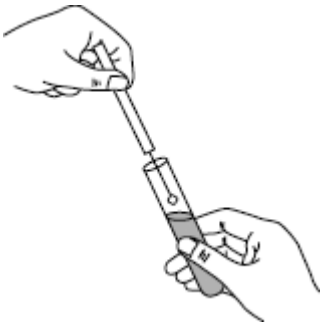
Stage V

A Petri dish with agar is heated to 150 °C for 50 minutes, then cooled

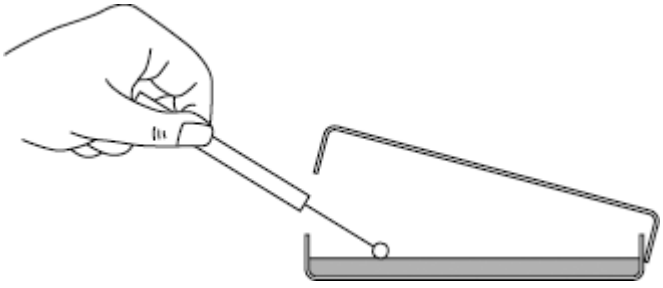
Stage W



Stage X



Stage Y



Stage Z  Petri dish kept at 25 °C for 48 hours

(i) Name the apparatus labelled **A** in stage **W**.

Draw a ring around **one** answer.

inoculating loop **pipette** **thermometer**

(1)

(ii) Give the letters of the **two** stages from **V**, **W**, **X**, **Y** and **Z**, which are carried out to kill microorganisms.

Stages ☐ and ☐

(2)

(iii) Give the letter of the stage, **V**, **W**, **X**, **Y** or **Z**, where incubation takes place.

Stage ☐

(1)

(b) A culture medium used for growing microorganisms contains various nutrients.

Which nutrient is the main source of energy for the microorganisms?

Draw a ring around **one** answer.

carbohydrates **mineral ions** **vitamins**

(1)

(Total 5 marks)

Q17.

Diet and exercise affect health.

(a) Many people are obese (very overweight).

Obesity can lead to heart disease.

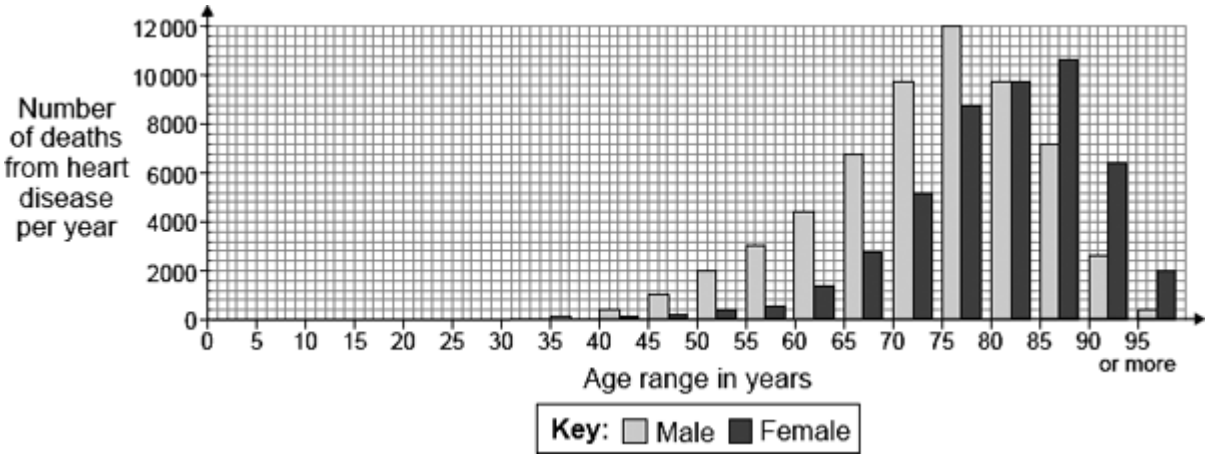
Other than heart disease, name **two** conditions which are linked to obesity.

1. _____

2. _____

(2)

(b) The graph shows the number of deaths from heart disease each year in the UK.



The pattern for deaths from heart disease in men is different from the pattern in women.

(i) Give **two** differences between the patterns for men and women.

1. _____

_____

2. _____

_____

(2)

(ii) Suggest **two** reasons for the difference in the number of deaths from heart disease in men and women between the ages of 40 and 60.

1. _____

_____

2. _____

_____

(2)

(c) Scientists have developed drugs to reduce the concentration of cholesterol in the blood.

Give the **three** main stages in testing a new drug before it is sold to the public.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(Total 9 marks)

Q18.

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

(a) Complete the sentences about vaccination.

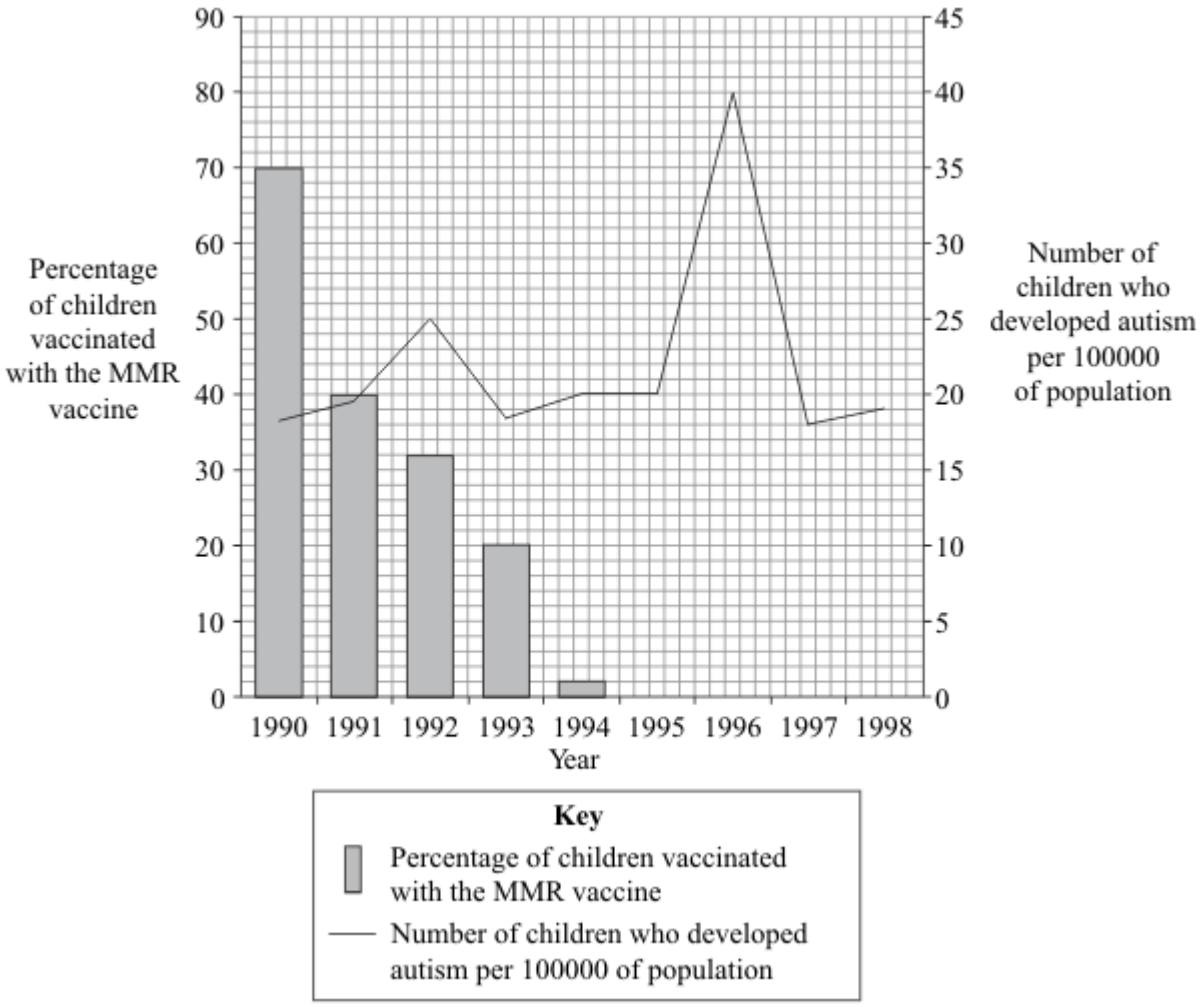
Vaccines stimulate white blood cells to produce _____ .

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.

_____

_____

_____

_____

_____

(2)

(Total 6 marks)

Q19.

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.

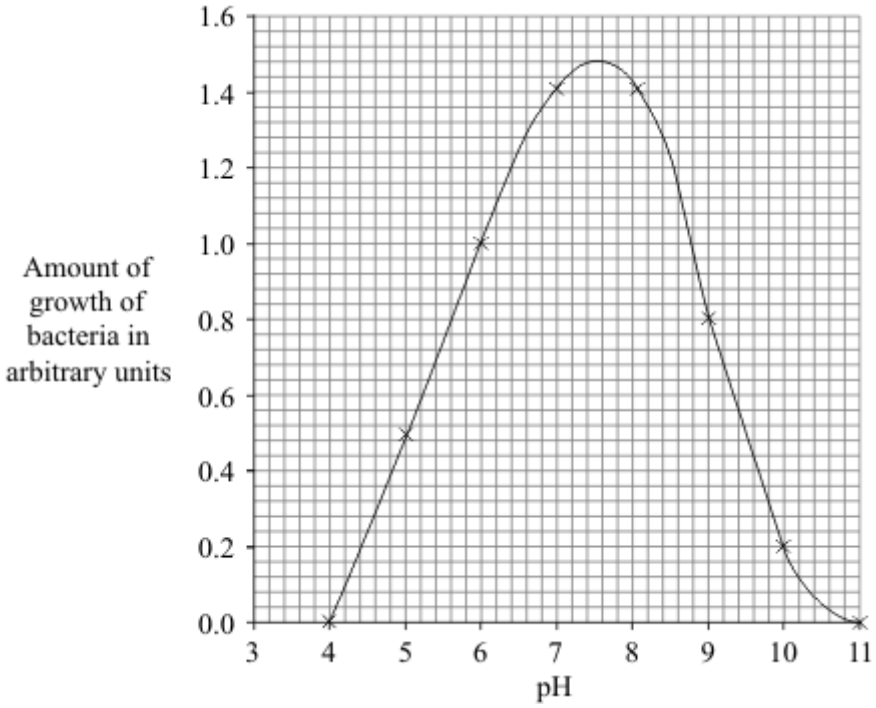
Suggest **two** conditions which should have been kept constant for all eight flasks.

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)

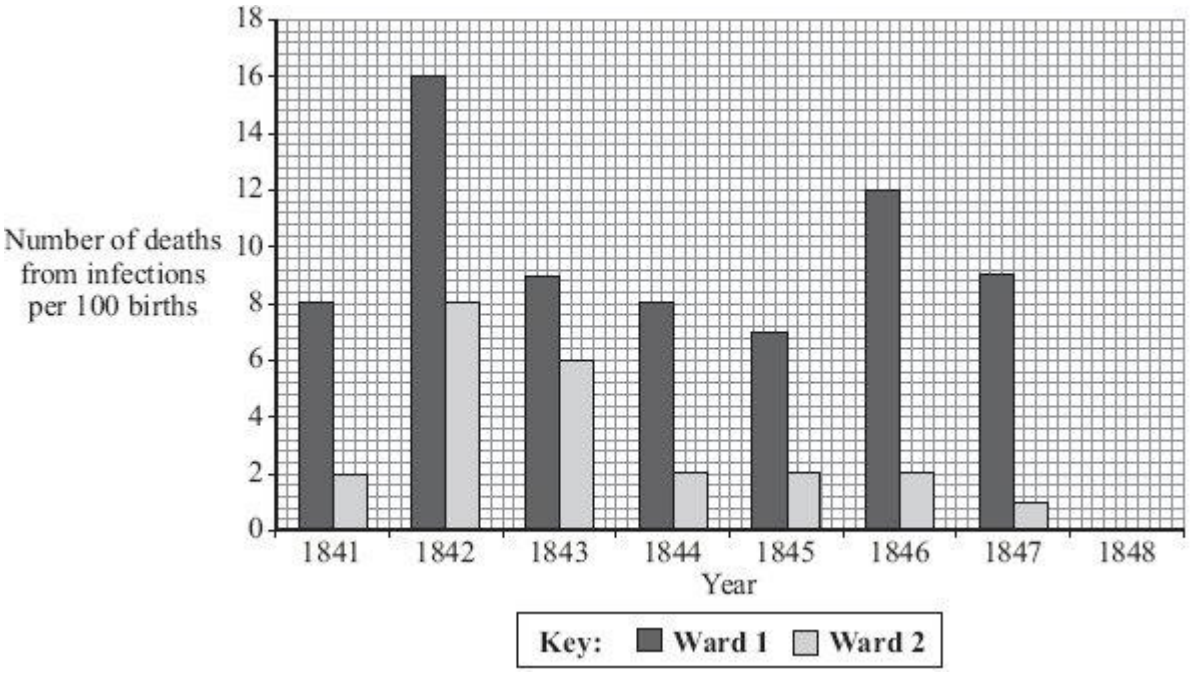
Q20.

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)

Q21.

Influenza is a disease caused by a virus.

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

_____

_____

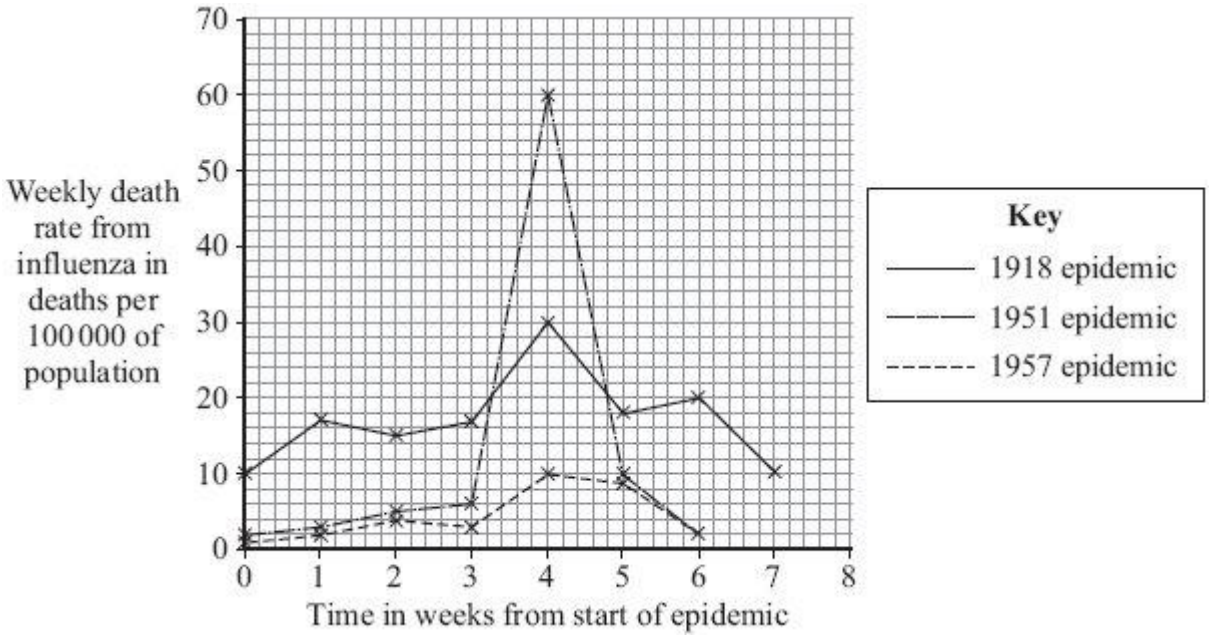
_____

_____

(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.

(3)

(Total 7 marks)

Q22.

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

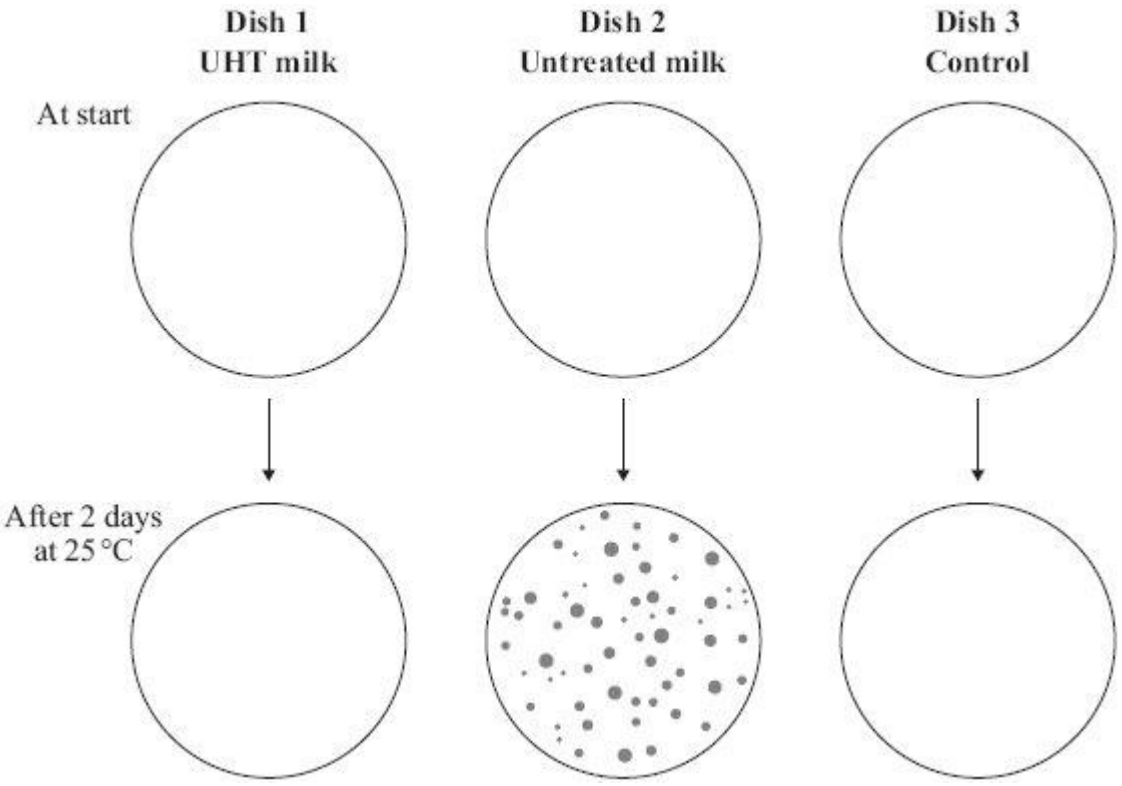
(3)

(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)

Q23.

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

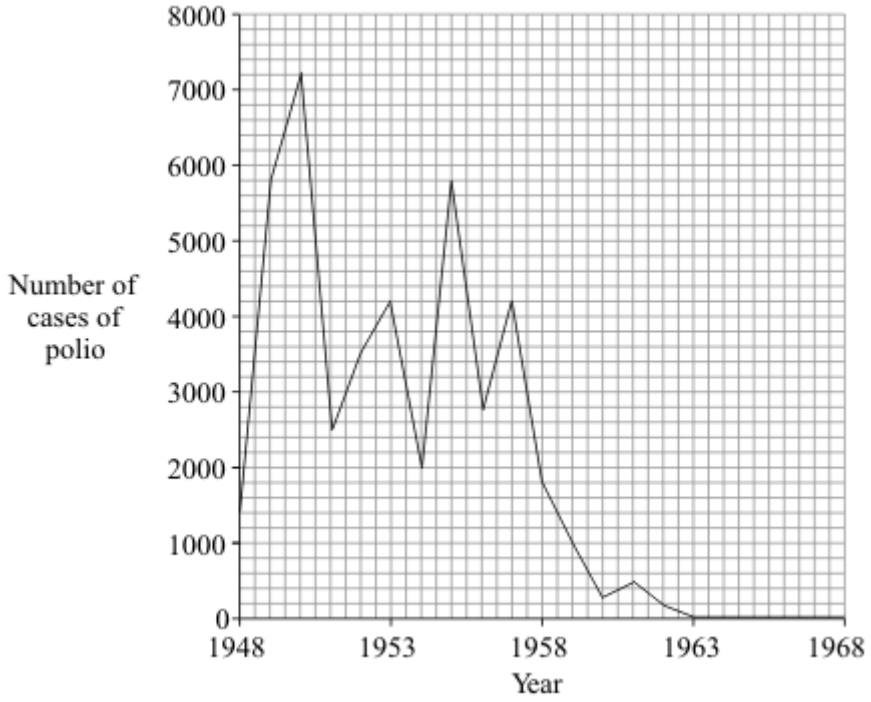
produce

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)

Q24.

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.

_____

_____

_____

_____

_____

_____

_____

(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.

_____

_____

_____

_____

(2)

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

Give the reason for your answer.

_____

_____

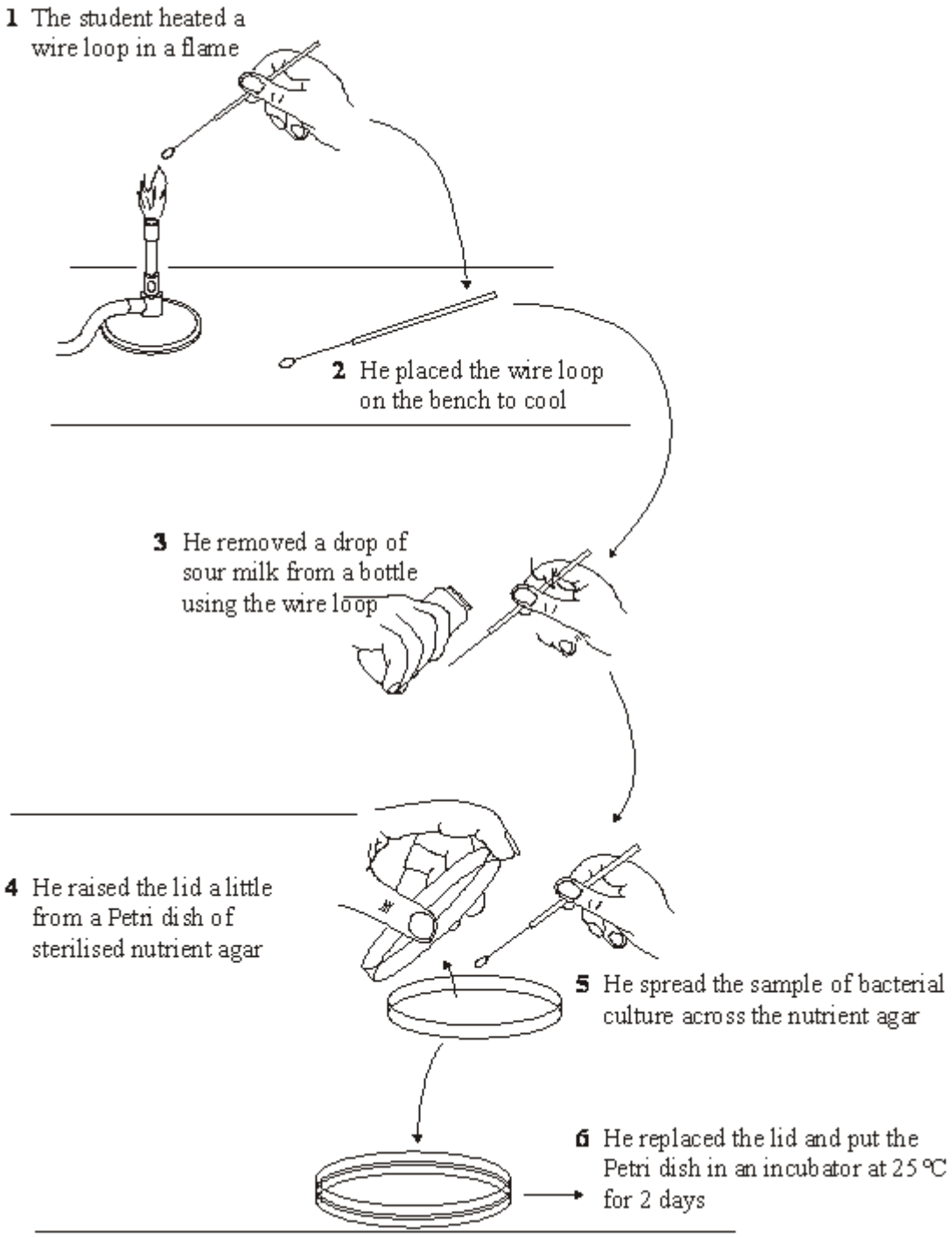
_____

(1)

(Total 6 marks)

Q25.

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)

Q26.

Pathogens can enter the body and cause disease.

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

_____

(1)

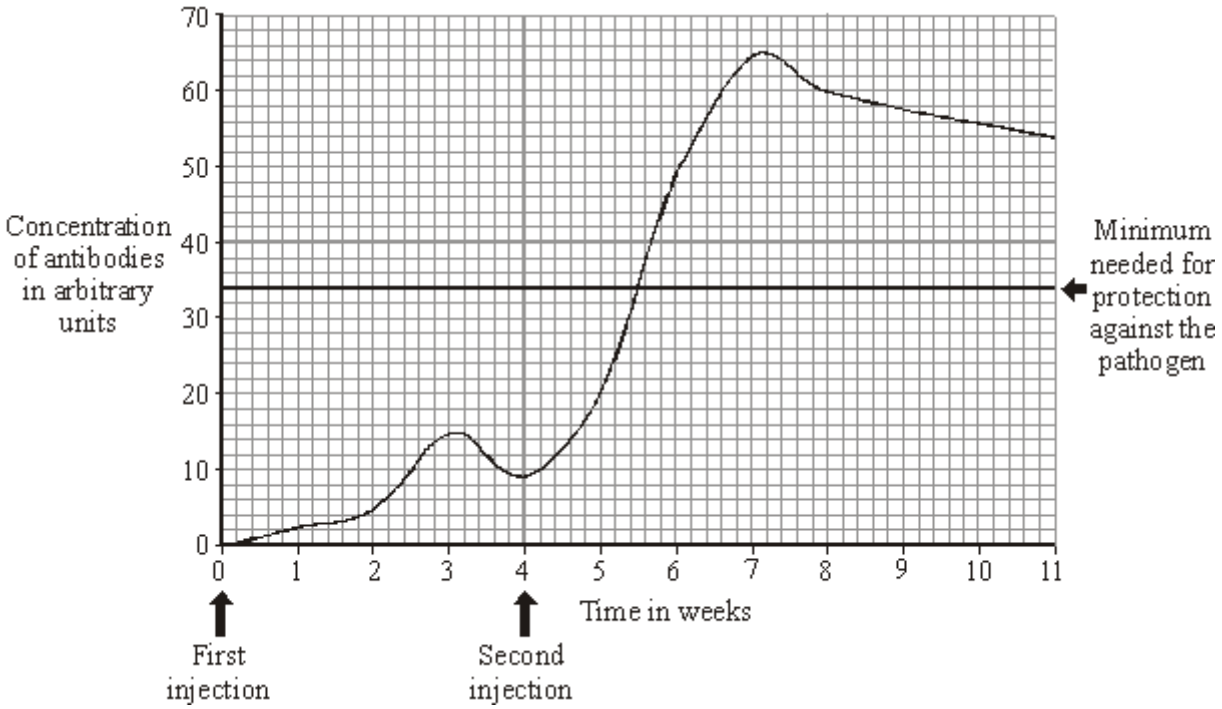
(ii) Name **one** type of medicine which helps to relieve the symptoms of infectious disease.

_____

(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)

Q27.

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.

_____

_____

_____

_____

_____

_____

(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.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 8 marks)

Q28.

(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)

Q29.

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

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

_____

_____

_____

_____

(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.

_____

_____

_____

_____

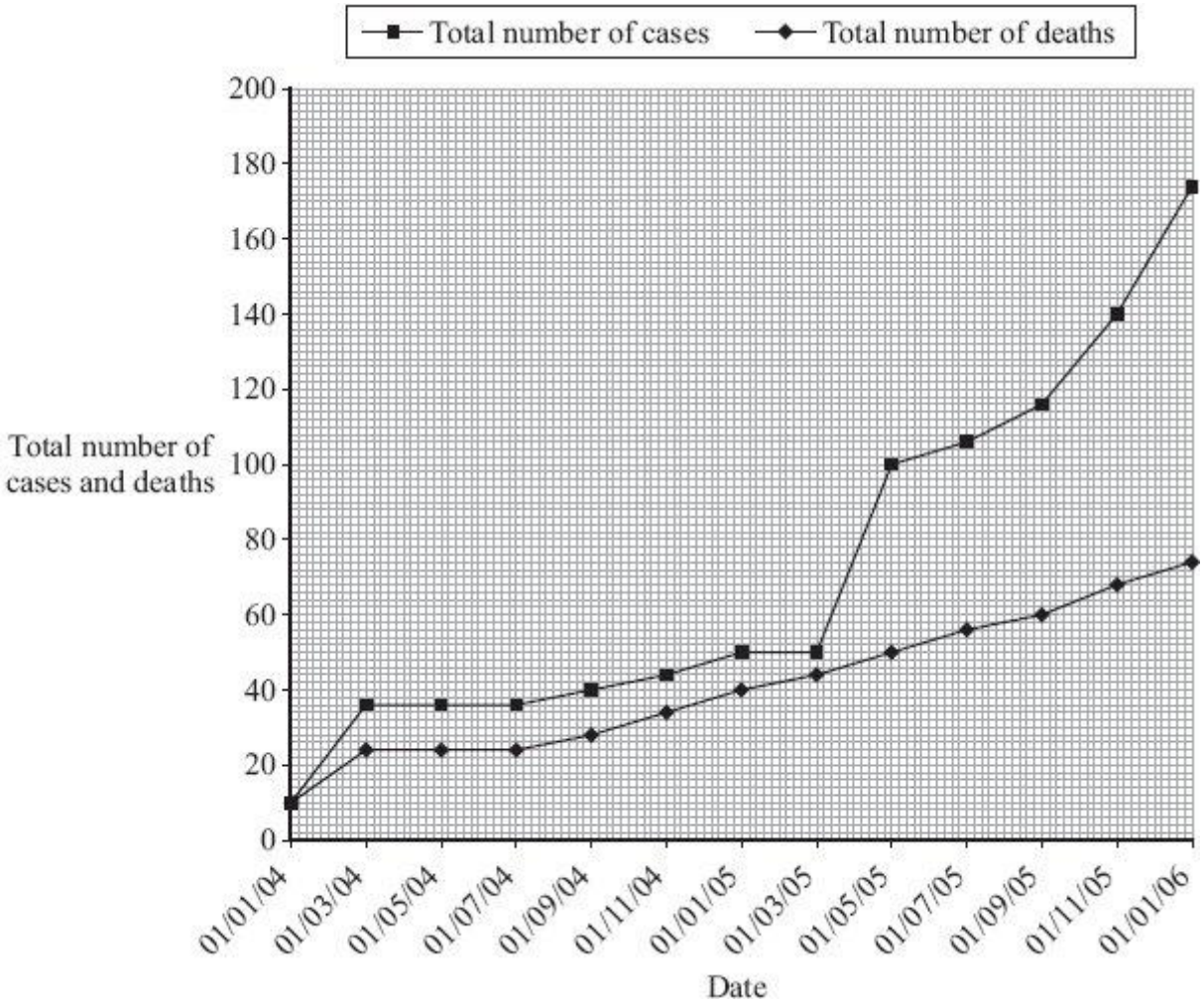
(2)

(Total 5 marks)

Q30.

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.

_____

(2)

(Total 5 marks)

Q31.

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

(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.

(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.

(3)

(Total 7 marks)

Q32.

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

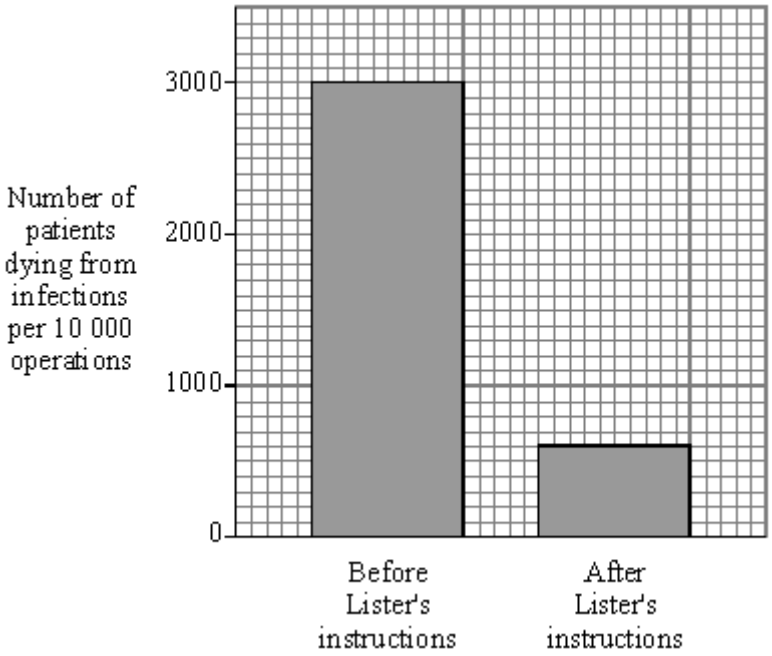
(a) Suggest why patients often died from infections after operations.

_____

(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.

_____

_____

_____

(2)

(Total 3 marks)

Q33.

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)

Q34.

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.

_____

_____

(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)

Q35.

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.

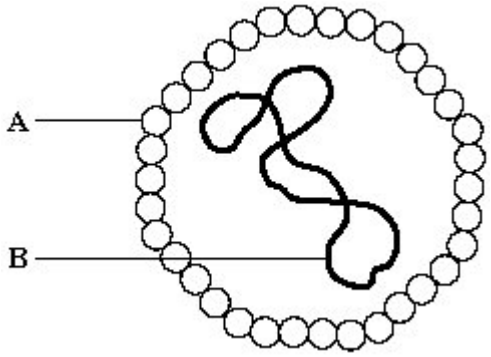
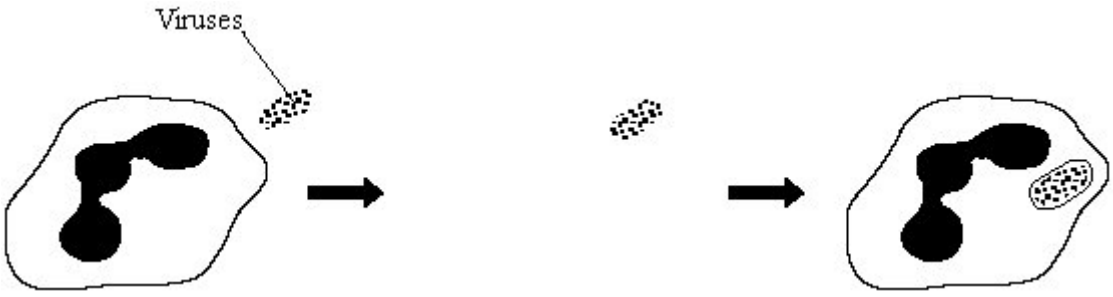


Diagram 1

(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.

_____

_____

_____

_____

(2)

(Total 4 marks)

Mark schemes

Q1.

(a) dead or inactive or weak form of pathogen / bacterium / virus / microorganism introduced

ignore disease / germ

1

(stimulates) white cells / lymphocytes / leucocytes

accept B and T cells

ignore phagocytes

1

to produce antibodies

ignore antitoxins / antigens

1

antibodies made quickly on re-infection / idea of memory cells

ignore already has antibodies

ignore 'body remembers'

1

(b) (i) alters / causes chemical processes / body chemistry

ignore craving / withdrawal symptoms

1

(ii) any **two** from:

- combined molecule / vaccine stimulates antibody production
- if nicotine taken, antibodies bind to nicotine molecules

ignore destroys nicotine

- making them too large to get to brain / making them ineffective

allow prevents nicotine entering brain

2

[7]

Q2.

(a) don't kill pathogens / bacteria / viruses / microbes / microorganisms

allow don't contain antibiotics

ignore antibodies / attack / fight

allow only treat symptoms / pain

ignore kill disease / germs

1

(b) any **two** from:

- age

- gender
- extent / severity of pain
  or how long had pain before trial
- type of pain / illness / site of pain
  *accept 'the pain' for **1** mark, if neither extent or type given*
  ignore pain threshold
- (body) mass / weight / height
  allow body size / physique
- other medical issues / drugs taken / health / fitness
- ethnicity

2

(c) (i) 75

ignore calculations / %

1

(ii) faster pain relief / decrease

allow pain relief sooner
***or** it works quicker*

***or** more pain relief at start / in first 1 / 1 $\frac{3}{4}$ hours*

1

(iii) decrease of pain higher / more

ignore more effective unless qualified by time > 1 $\frac{3}{4}$ hours allow effect lasts longer

1

decrease of pain is longer lasting

1

(d) any **three** from:

ignore yes or no

(Yes because)

- rapid pain relief (from A)
- long lasting pain relief (from B)
- and it costs less
- the sum of the pain relief (from A + B) is greater (than X)

(No because)

- drug X gives more pain relief

- (A + B / they) might interact with each other
- could result in overdose
- could be more / new side effects

if neither points gained
allow (more) dangerous

3

[10]

Q3.

(a) (i) dead / inactive / weakened

allow antigen / protein
ignore ref to other components
ignore small amount

1

pathogen / bacterium / virus / microorganism

ignore germs / disease

1

(ii) *antigen / antibiotic instead of antibody = max 2*

white blood cells produce / release antibodies

accept lymphocytes / leucocytes / memory cells produce antibodies
*do **not** accept phagocytes*

1

antibodies produced quickly

1

(these) antibodies destroy the pathogen

allow kill
*do **not** accept antibodies engulf pathogens*

1

(b) (i) (live) bacteria still in body

ignore numbers

1

would reproduce

ignore mutation / growth

1

(ii) antibiotics / treatment ineffective **or** resistant pathogens survive

accept resistant out compete non-resistant

1

these reproduce

1

population of resistant pathogens increases

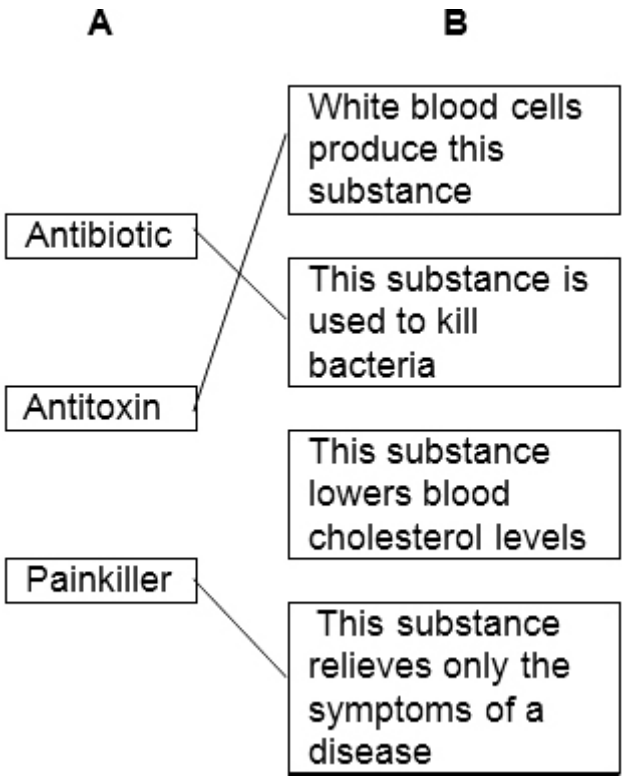
allow (resistant pathogens reproduce) rapidly

1

[10]

Q4.

(a)



1 *mark for each correct line*
mark each line from left hand box
two lines from left hand box cancels mark for that box

3

(b) inactive

allow weak / dead / un-living / safe

1

rubella

apply list principle, but ignore measles and mumps

1

[5]

Q5.

(a) any **two** from:

ignore eating disorder
ignore cancer

- arthritis

  accept worn joints

- diabetes

accept high blood sugar

- high blood pressure
  ignore cholesterol
- heart disease / heart condition / heart attack / blood vessel disease
  allow blood clots / strokes

2

(b) (i) $\frac{1}{4}$ **or** 0.25 **or** 25%
*correct answer gains **2** marks*
*if answer incorrect, evidence of 1500 ÷ 6000 gains **1** mark*
*25 without % gains **1** mark*

2

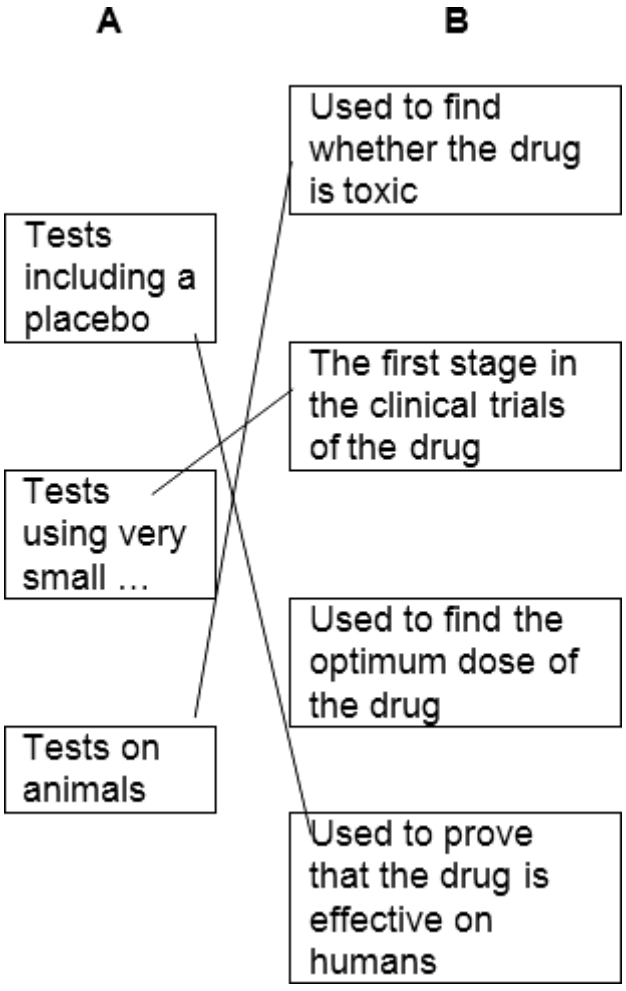
(ii) majority / most / high proportion of people in trial lost mass / weight
ignore good results / it worked

1

[5]

Q6.

(a)



1 *mark for each correct line*

mark each line from left hand box

two lines from left hand box cancels mark for that box

3

(b) any **three** from:

Students have been informed that the headline is not justified

- reference to reliability, eg only a small number of mice tested
  or trial too short
  or investigation not repeated

- reference to control, eg mice given caffeine <u>not</u> coffee
  or 6 cups (equivalence) is more than 1 dose

- (and) the effect on mice might not be same as on humans

  allow only tested on mice

- (also) text suggests that the treatment improves memory loss (rather than delays it)

  accept text suggests disease cured

  or mice already have memory loss or experiment only showed improvement in memory
  or does not show **delays** Alzheimer's
  or experiment not done on old mice

  allow reference to the fact that mice engineered to have it

3

[6]

Q7.

(a) 18.06 / 18 / 18.1

*correct answer gains **2** marks*

if answer incorrect evidence of

(4131 - 3499) ÷ 3499 × 100

***or** 632 ÷ 3499 × 100*

***or** ((4131 ÷ 3499) × 100) - 100*

***or** 0.18*

*gains **1** mark*

2

(b) antibiotics kill non-resistant strain
or resistant strain bacteria survive

accept resistant strain the successful competitor

*do **not** accept intentional adaptation*

ignore strongest / fittest survive

ignore mutation

ignore people do not finish antibiotic course

1

resistant strain bacteria reproduce
or resistant strain bacteria pass on genes

1

population of resistant strain increases **or** proportion of resistant bacteria increases

allow high numbers of resistant bacteria

or

people more <u>likely</u> to be infected by resistant strain (than non-resistant strain)

1

[5]

Q8.

(a) cell division / bacterium divides / multiplies / reproduces

allow asexual / mitosis

ignore growth

1

(b) 18

1

18 000 / 18 × 10^3 / 1.8 × 10^4

*do **not** accept 1.8 / 1.8 ^{04} / 1.8^4*

allow ecf from wrong count

1

(c) to kill / destroy other microorganisms / named type
or to prevent contamination

ignore germs / viruses

1

to prevent other microorganisms affecting the results
or other microorganisms would be counted

allow to give accurate / reliable results

1

(d) prevent growth of pathogens / disease-causing microorganisms / dangerous microorganisms

*do **not** accept microorganisms <u>become</u> pathogenic*

ignore germs / viruses

ignore general safety / biohazards / harmful products produced by bacteria

1

(e) to improve the reliability of the investigation / check for anomalies

*do **not** accept accuracy / precision / fairness / validity*

ignore averages / repeatability / reproducibility

1

[7]

Q9.

(a) kills / destroys bacteria / MRSA

*do **not** allow germs*

1

prevents / reduces transfer

allow stops MRSA entering ward

1

(b) mutation

*do **not** accept antibiotics causes mutation*

1

(causes) resistance

allow not effective

ignore immunity

1

to antibiotics

1

[5]

Q10.

(a) any **two** from:

- (high) CRP / protein
- (no) heart condition

  allow health
- (not high) LDL
- over 50 / age
- number of tablets (each day)

  ignore time

  ignore placebo / rosuvastatin

  ignore number of people

2

(b) any **one** from:

- tablet with no drug

  allow fake (pill) / dummy (pill) / sugar / chalk (pill)
- tablet that has no effect

  allow drug that has no effect
- tablet without chemicals

  ignore vitamin / mineral pill
- tablet that people thought contained statin **or** reference to psychological effect

ignore control / different statin

1

(c) 17802 / large number of people **or** enough people

ignore control group / fair test / control variables

ignore time / repeats

1

(d) any **one** from:

ignore cost

- placebo group at risk of heart attack **or** to allow statin to be given to everyone
- statin group 54% less likely to get heart attack **or** showed that statin worked **or** showed trial (very) successful

  ignore reliable
- sufficient information gained / results conclusive

  ignore got results early
- unethical / unfair to carry on trial

1

(e) to avoid bias **or** show impartiality **or** show results independent

allow manufacturers could cheat

ignore reliability

ignore could be sued / blamed if trial went wrong

ignore manufacturer would know which group got statin / placebo

1

(f) any **two** from:

- reduction in LDL

  *allow improves LDL:HDL balance **or** LDL and HDL concentrations equal*

  ignore less cholesterol

  ignore more HDL

  *do **not** accept less HDL*
- reduction in (saturated) fats
- reduces deposition of fat / cholesterol / LDL in walls of blood vessels **or** blood vessels less likely to be blocked with fat / cholesterol / LDL

2

[8]

Q11.

(wbc) ingest / digest pathogens / bacteria / viruses

allow eat germs

ignore swallow germs
ignore ingest the disease
ignore attack / kill the disease

1

(wbc) produce antibodies

1

(wbc) produce antitoxins

1

any **one** from:

- (antibodies) destroy or kill pathogens / bacteria / viruses / germs
  ignore destroy / kill disease
  ignore attack / fight pathogens
- (antitoxins) counteract / destroy / neutralise toxins / poisons
  ignore attack / killing toxins
- reasonable reference to memory cells **or** rapid production of antibodies upon re-infection

1

[4]

Q12.

(a) measles

1

mumps

1

rubella

1

(b) antibodies

1

(c) (i) any **two** from:

- fell
- then rose
- any reasonable amplification eg until 2004 / to 80%
- flattens off (between 1999–2000)

2

(ii) eg fear of side effects

or

cost of vaccine

or

lack of vaccine

or

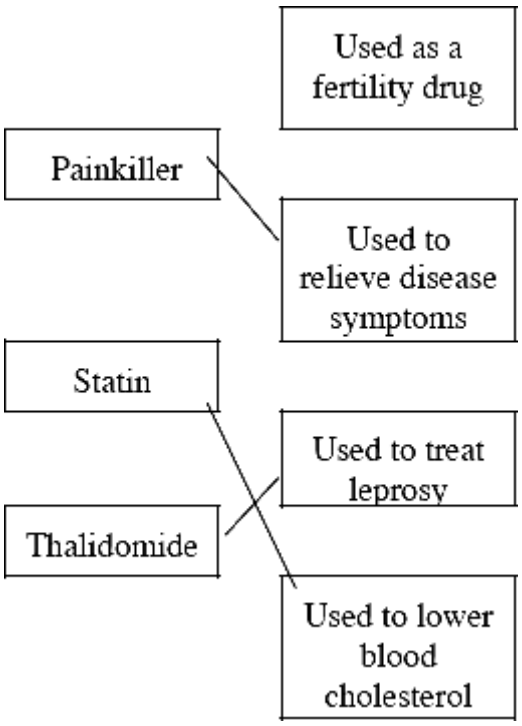
complacency / disease less common

1

[7]

Q13.

(a)



*all three correct = **3** marks*
*two correct = **2** marks*
*one correct = **1** mark*
extra line from a statement cancels the mark

3

(b) (i) 8

1

(ii) 3210

1

(c) (i) if it is toxic

1

(ii) if it has side effects

1

[7]

Q14.

(a) testing for toxicity / see if it is safe /see if it is dangerous / to see if it works

ignore side effects unqualified

1

(b) (i) testing for side effects / testing for reactions (to drug)

ignore to see if it works

*do **not** accept dosage*

1

(ii) any **one** from

ignore immune system

- dose too low to help patient
- higher risk for patient
- might conflict with patient's treatment / patient on other drug
- effect might be masked by patient's symptoms / side effects clearer

1

(c) to find optimum dose

*allow testing on larger sample **or** it makes results more reliable*

allow to find out if drug is effective /find out if drug works on ill people (not just if drug works)

1

(d) (i) (tablet / drug / injection) that does not contain drug

allow control / fake / false

allow tablet / injection that does not affect body

*do **not** accept drug that does not affect body*

1

(ii) neither patients nor doctors

1

[6]

Q15.

(a) produces toxins / damage cells / reproduce rapidly **or** reproduce in cells

ignore invade cells

1

(b) any **three** from:

- TV crew immune / Indians not immune / Indians have weak(er) immune system

  ignore resistant

- TV crew had / produced antibodies / Indians had no antibodies **or** antibody production faster in TV crew

- TV crew had previous exposure to flu / had been vaccinated
  or
  Indian tribe had no previous exposure to flu / had not been vaccinated
  allow immunised

- Indians caught disease from TV crew
  or
  TV crew were carriers (of the virus)

3

[4]

Q16.

(a) (i) inoculating loop

1

(ii) V

1

W
either order

1

(iii) Z

1

(b) carbohydrates

1

[5]

Q17.

(a) any **two** from:

- arthritis
  allow damaged joints

- diabetes
  accept high blood sugar

- high blood pressure

- strokes
  allow blocked blood vessels / thrombosis

- allow breathing difficulties
  ignore cancer
  ignore high cholesterol

2

(b) (i) any **two** from:
to gain marks there must be a comparison
ignore comparison at single age

- lower number of women deaths up to age of 75-80
- higher number of women deaths after 80
  ignore women die older ***or*** *men die younger*
- men's peak higher
- men's peak at an earlier age
- men's death start earlier than women
- more men than women die of heart disease

2

(ii) any **two** from:

- men smoke more (cigarettes)
  ignore alcohol
- more men smoke
- men under more stress
- men less active
- more men overweight / eat more / less diet conscious **or** different fat distribution
  ignore reference to body size
- genetic factors
- men might have lower metabolic rate
  ignore references to hormones
- men less likely to visit doctor even though they have symptoms

2

(c) *points can be in any order*

laboratory tests / tests on tissues
or
tests on animals
or
tests for toxicity
ignore computer simulations

1

tests for <u>side effects</u> on volunteers / healthy people / small numbers

1

widespread testing
or
testing for optimum dose
or
test on patients / sick people

or
test to see if it is effective
accept use of placebo

1

[9]

Q18.

(a) antibodies
allow antitoxins / memory cells
*do **not** allow antigens*

1

immune
ignore protection
allow resistant

1

(b) (i) fell

1

numerical qualification to zero / nothing / by 100%
allow stopped in 1995

1

(ii) (no)
ignore circle

1

% vaccination fell **or** when no vaccination

but autism numbers did not fall / stayed high / increased

or

'(yes) might support it if time lag between vaccination and autism symptoms' / 'time lag for diagnosis' (1)

6 year time lag quantified (1)

1

[6]

Q19.

(a) any **two** from:

- sterilise / kill microorganisms
  ignore 'cleaning' / 'disinfect'
  ignore 'germs'
- method of sterilisation eg apparatus / media sterilised in oven / autoclave
  allow pressure cooker / boiling water
- pass flask mouth / pipette tip / loop / test tube mouth through flame

- work near a flame
- minimise opening of flask / test tube **or** hold non-vertical
  *allow idea of sealing / covering **or** prevent entry of air*

2

(b) any **two** from:

- temperature
  ignore references to time / type of bacterium
- concentration / amount of nutrients / ions
- type of nutrient
- volume / amount of solution
- amount of bacteria added
- agitation **or** amount of oxygen

2

(c) (i) 7.5
accept in range 7.4 – 7.6

1

(ii) use more pH values around / close to pH 7.5 / between 7 and 8

1

[6]

Q20.

(a) (i) 12
*correct answer with **or** without working*
*if answer incorrect evidence of (number of deaths) × 6 **or** 2 seen gains **1** mark*

2

(ii) (ward 2)

more deaths / infections on ward 1

or

less deaths / infections on ward 2

1

(b) (i) **both** bars correctly plotted
*ie plots in spaces between 2.8 and 3.2 **and** 0.8 and 1.2*
ignore width and shading

1

(ii) less deaths / infections

1

(iii) bacteria / germs / microbes / infection killed / washed off

accept less infections passed on

1

[6]

Q21.

(a) any **two** from

- live inside / infect body cells
- difficult for drugs to enter (body) cells / drug would kill (body) cell
- antibiotics ineffective against viruses
- viruses mutate **frequently**

2

(b) (i) 420

*correct answer with **or** without working*

*if answer incorrect evidence of 'number of deaths' × 7 **or** 60 seen gains **1** mark*

ignore 6 000 000

2

(ii) any **three** from:

- virus / flu mutates
- people no longer / not immune

  ignore resistance
- white blood cells / memory cells / immune system do not recognise virus
- relevant reference to antibodies / antigens
- current vaccine ineffective **or** no vaccine available then **or** takes time to develop new vaccine

  allow no tamiflu / anti-viral drugs
- conditions less hygienic / lack of hygiene
- people in poor health (following world wars)

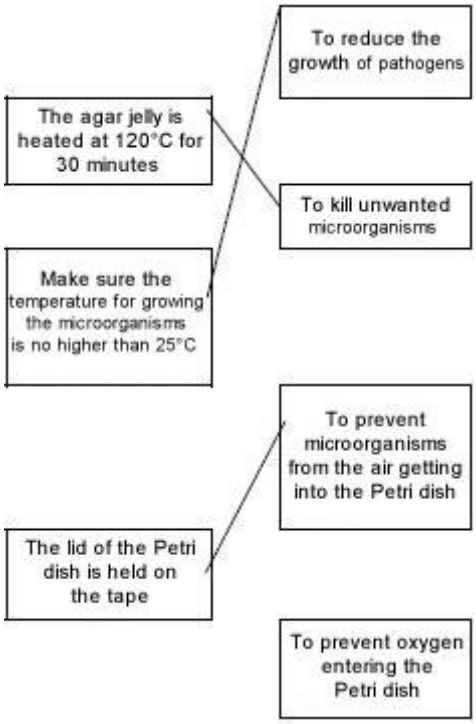
  allow people had 'weak' immune system

3

[7]

Q22.

(a) **Liast A – Action** **List B – Effect**



1 *mark per correct line*

each extra line cancels ***1*** *mark*

3

(b) (i) dish 2 has (colonies of) microorganisms / bacteria / (but there are none in dish 1)

allow fungi / pathogens / microbes / germs

allow more microorganisms in dish 2

1

(ii) untreated milk contains <u>living</u> microorganisms

or

microorganisms killed by UHT

or

no <u>living</u> microorganisms in UHT milk

ignore microorganisms enter from the air

1

(iii) dish 3 was not opened

do ***not*** *allow no growth of microorganisms because of lack of air / oxygen*

or

it was sterilised

ignore microorganisms cannot enter from the air

or

nothing / no milk was added

1

[6]

Q23.

(a) (i) lives inside cells

1

(ii) inactive

1

(iii) antibodies

1

(b) (i) 1950

1

(ii) 8 (years)

1

(iii) any **one** from: eg

- disease could be reintroduced (from abroad)
  disease might come back insufficient
- disease would spread if it came back
- protection on holiday abroad
- high proportion of immune people needed to prevent epidemic

1

[6]

Q24.

(a) any **three** from:

- vaccine is inactive / dead form of (pathogen)
  allow antigens
- stimulates antibody production
- stimulates antitoxin production
- by white cells
- antibodies kill (pathogen)
- antitoxins neutralise poisons
- antibodies quickly produced on reinfection
  ignore antibodies remain in blood

- reference to ingestion by white cells

3

(b) (i) (no)

any **two** from

- sample size small / only 12
- conclusion based on hearsay from parents
- only 8 parents linked autism to MMR
- no control used

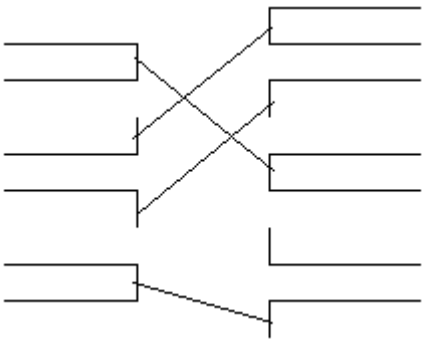
2

(ii) (yes)
being paid by parents / lawyers

1

[6]

Q25.



1 *mark for each line*
extra line from List A Action cancels the mark

[4]

Q26.

(a) (i) antibiotic or named antibiotic
ignore antibodies
accept antiseptic
*do **not** accept disinfectant*

1

(ii) painkillers
accept named painkillers eg aspirin

1

(b) (i) 5.5 / 5 ½ weeks

1

(ii) rose gains **1** mark

rose, then fell then rose again gains **2** marks

a further **1** mark for **one** quantitative statement eg

- rose for 3 weeks / to 14–15 units
- dropped to 4 weeks / 9 units
- rose to 7 weeks / 64–65 units

3

(iii) (no)

level begins to fall / is falling (after 7 weeks)

1

[7]

Q27.

(a) (bacteria) produce toxins / poisons

1

(viruses) damage / kills cells **or** toxins released from cell

1

(b) any **two** from:

- viruses live inside cells
- viruses inaccessible to drug
- drug would damage body cells / tissue

2

(c) any **four** from:

- overuse of antibiotics
- bacteria mutate

  *do **not** allow antibiotic causes mutation*
- antibiotics kill non-resistant strains **or** idea of selection
- reduced competition
- resistant bacteria reproduce

4

[8]

Q28.

(a) antibodies

1

antitoxins

1

antibiotics

1

(b) any **two** from:

- measles
- mumps
- rubella / German measles

2

(c) less / low / no chance of getting named / all condition(s) if vaccinated

1

quantitative figure(s) e.g. 5 times less likely to get convulsions

must be comparative

1

(d) enzymes

1

genes

1

[9]

Q29.

(a) any **two** from:

virus is neutral

- resistant to (most) antibiotics
- contagious **or** easily passed on **or** reference to open wounds
- patients ill therefore less able to combat disease

2

(b) (i) chloride of lime / hand washing killed bacteria (picked up from corpses)

allow disease / germs / infection / disinfectants

1

(ii) people to wash hands after contact with patient

1

so <u>bacteria</u> / <u>pathogen</u> / <u>MRSA</u> not transferred to other patient

1

[5]

Q30.

(a) (i) 56

accept 54 – 58

1

(ii) increased

1

reasonable qualification eg slowly then more quickly
or
to 174 / 176
or
by 138 / 140

1

(b) any **two** from:

- no immunity **or** antibodies ineffective
  accept no resistance
- no vaccines **or** humans not immunised
- idea of large scale contact **or** large scale travel
  *do **not** accept passed on*
  ignore no cure

2

[5]

Q31.

(a) (i) viruses live inside cells

1

viruses inaccessible to antibiotic
allow drug / antibiotic (if used) would (have to) kill cell

1

(ii) mutation
ignore mutation caused by antibiotic

1

natural selection **or** no longer recognised by antibiotics
accept description of natural selection

1

(b) (stimulate) antibody production
ignore antitoxin

1

(by) white cells

1

<u>rapidly</u> produce antibody on re-infection
ignore antibodies remain in blood

1

[7]

Q32.

(a) dirty clothes/equipment/hands passed bacteria

allow bacteria from any sensible source e.g. surgeon, floor

OR

ease of entry of bacteria (during operations)

*do **not** accept germs*

1

(b) fewer died

1

indication of reduced number **or** proportion

e.g. 3000→ 600

down by 2400

20% of previous deaths

1

[3]

Q33.

(i) kills / destroys bacteria **or**
prevents growth of bacteria

*do **not** allow germs*

*do **not** allow fights or gets rid of*

1

(ii) any **two** from:

bacteria may be resistant / immune (treatment futile)
or bacteria would not be killed

accept descriptions from table
accept "fights" here

do not accept people resistant

may select for resistant type

may cause increased incidence of resistance or Penicillin less effective in future

sore throat might be due to a virus – Penicillin would not work

2

[3]

Q34.

(a) measles

ignore mumps

1

rubella

accept German measles

1

(b) viruses are 'dead'

accept other viral treatments
accept 'non-virulent'
mild' must be qualified
*do **not** accept 'small dose'*

1

(c) *The answer to this question requires good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme*.

Maximum of 4 marks if ideas not well expressed

any **five** from:

contains antigens or proteins

accept reference to immunological memory or memory cells'

white cells (accept lymphocytes)

do not accept phagocytes

idea of specificity in antibodies or antigens

antibody <u>production</u>

ignore engulfing

antigens destroyed / virus destroyed

<u>rapid</u> antibody production if infected

max 5

(d) antibiotics do not kill / affect viruses

1

[9]

Q35.

(a) (i) diagram shows extensions of intact cell membrane around viruses

1

(ii) antibodies

allow enzymes re (ii)
allow interferon
ignore antitoxins / proteins

1

(b) <u>virus</u> is transferred

1

(virus in) blood / body fluids – transfer (via needles)

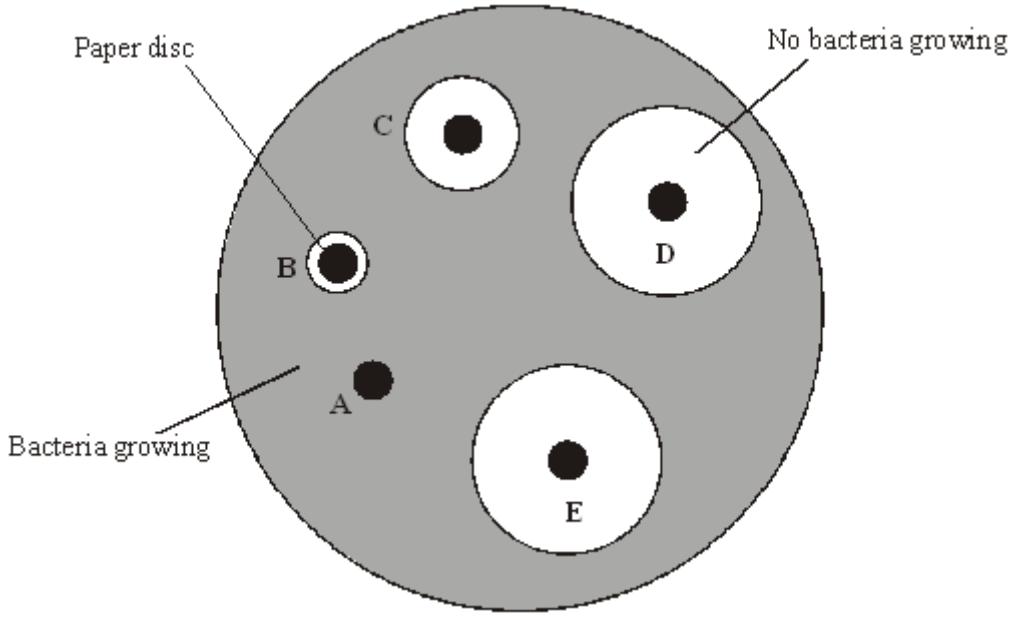
1

[4]

Q1.

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.

(5)

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

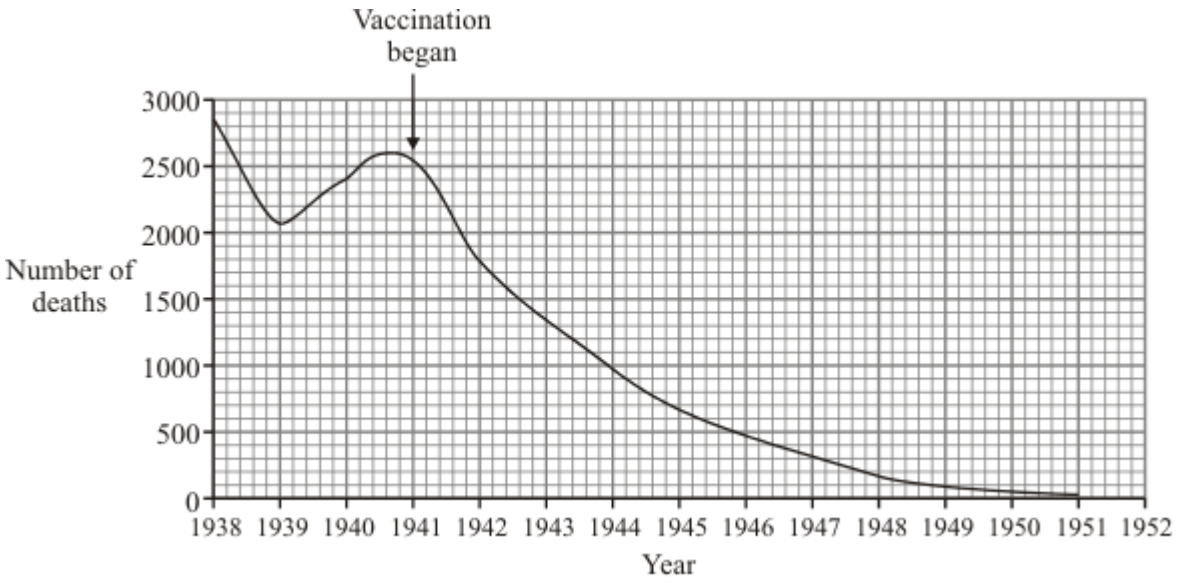
Suggest **two** ways by which this problem could be limited.

(2)

(Total 11 marks)

Q2.

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)

Q3.

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.

(Total 3 marks)

Q4.

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.

_____

_____

_____

_____

(5)

(Total 6 marks)

Q5.

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:

_____

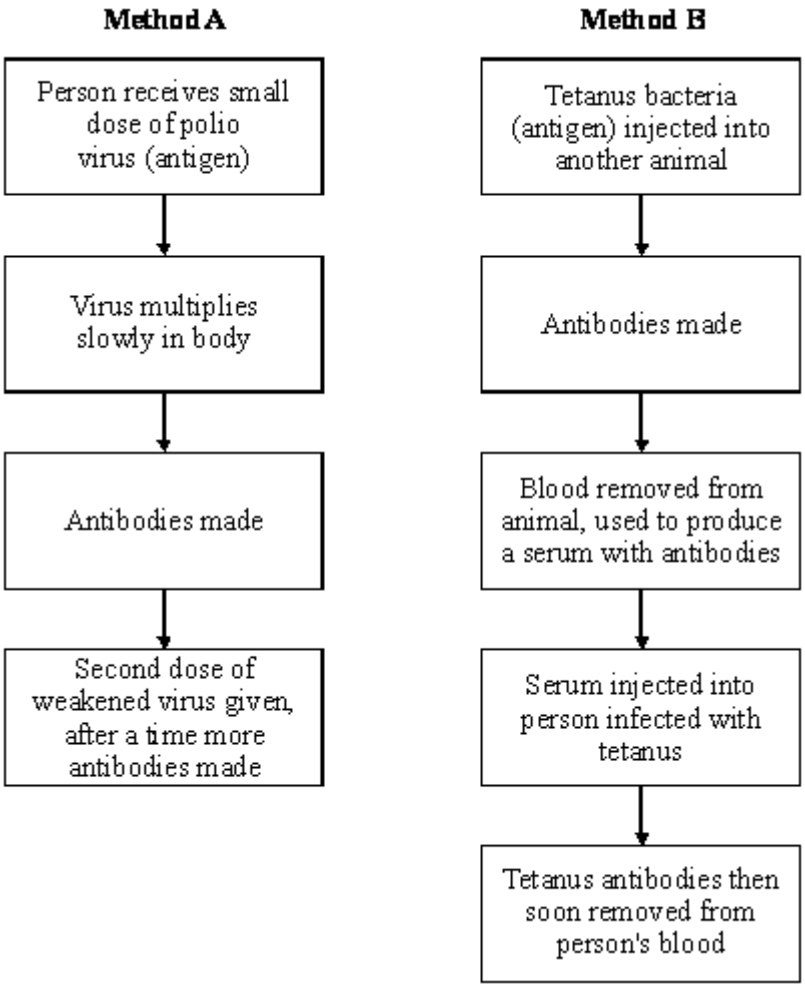
_____

(1)

(Total 4 marks)

Q6.

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?

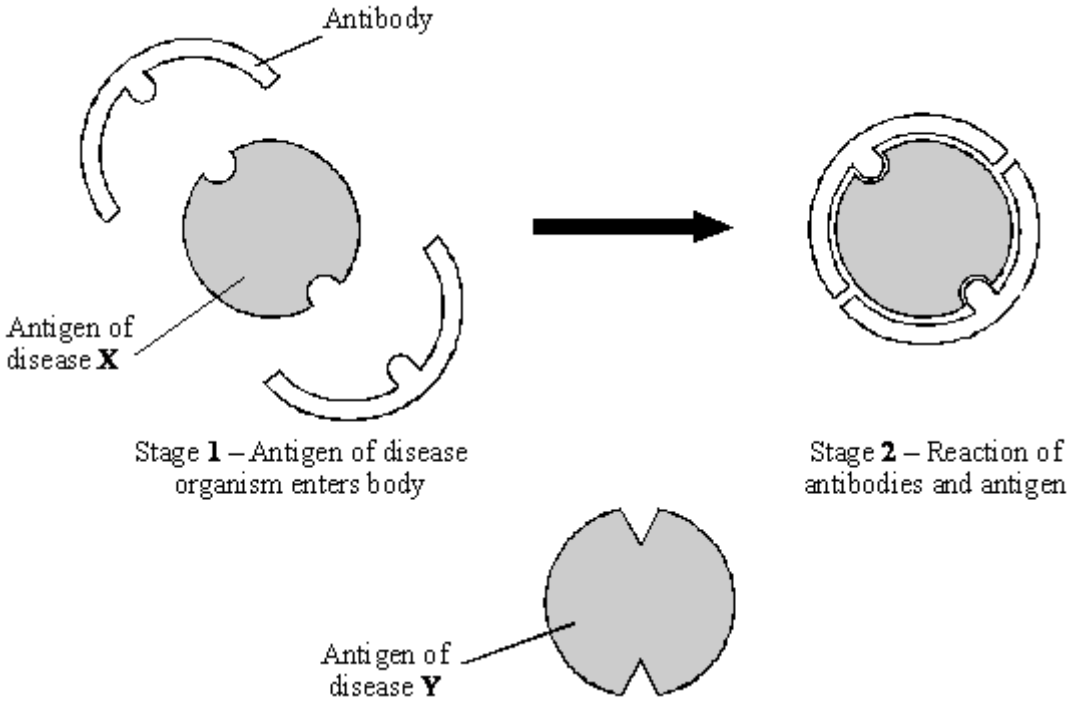
_____

(1)

(Total 7 marks)

Q7.

(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**.

_____

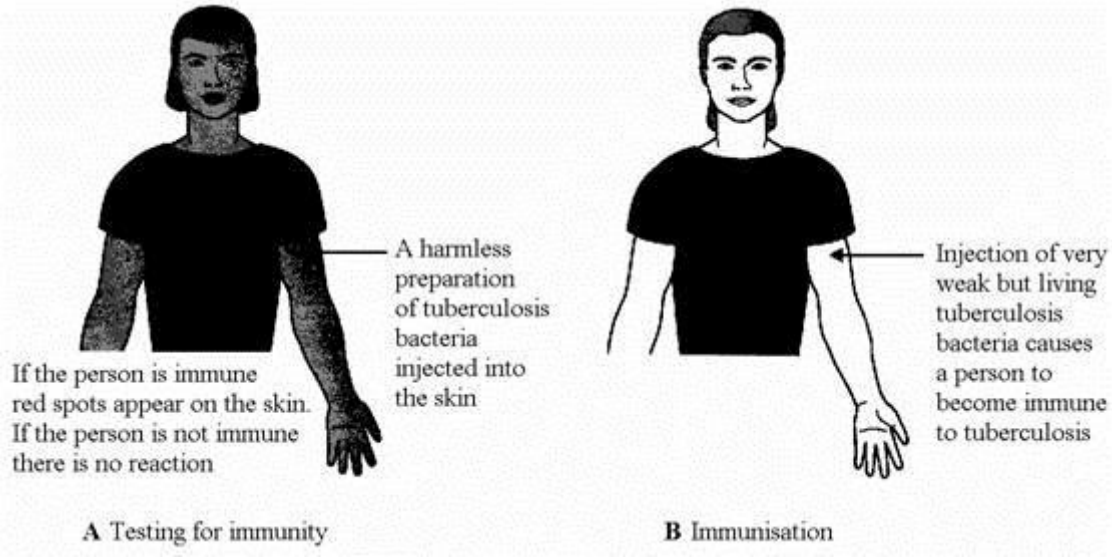
_____

_____

(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.



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

_____

_____

_____

(2)

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

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

Q8.

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.

(Total 5 marks)

Q9.

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.

(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.

(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.

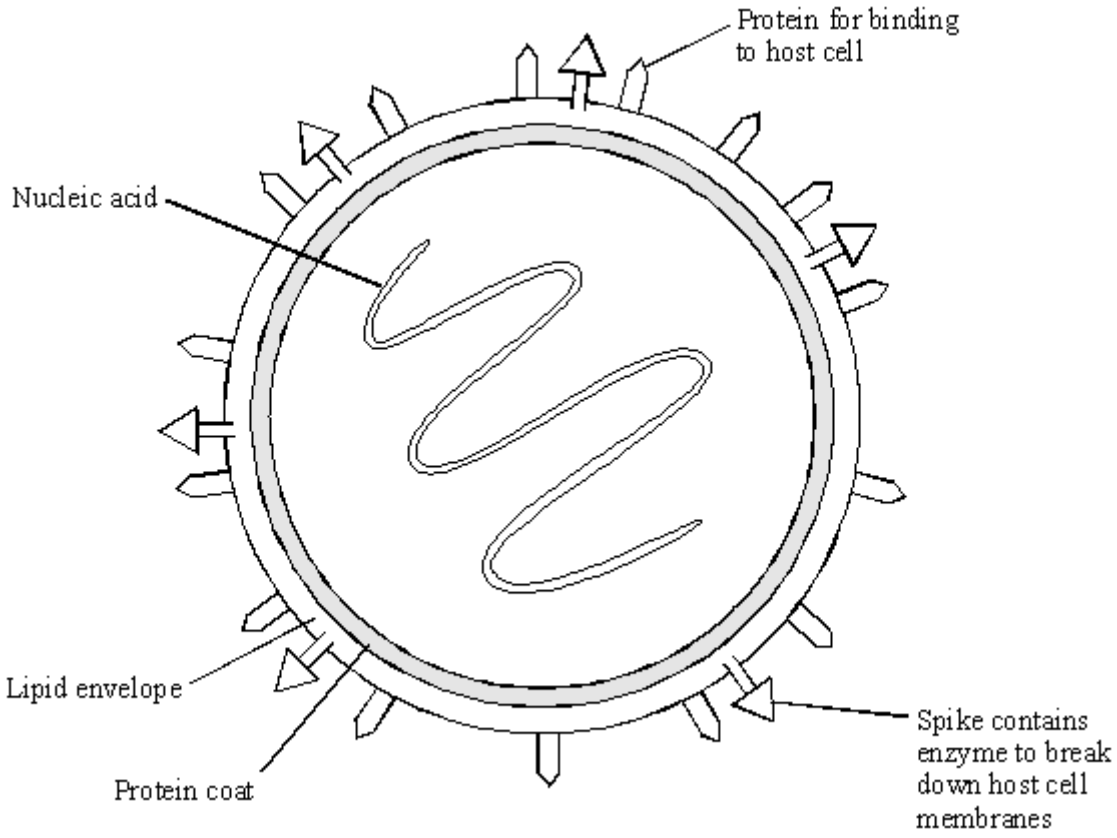
_____

(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.

_____

_____

_____

_____

_____

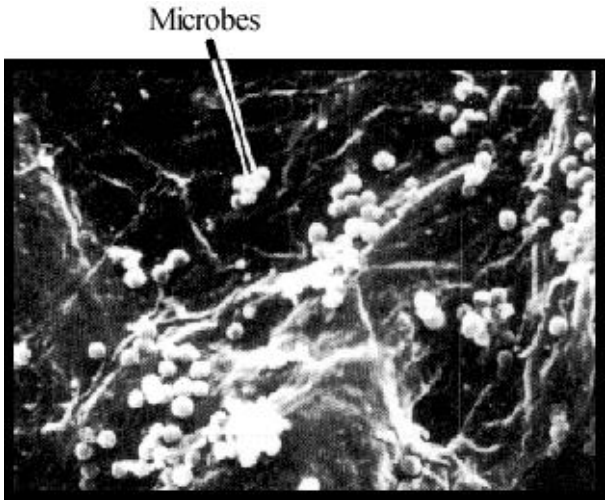
_____

(3)

(Total 10 marks)

Q10.

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. _____

_____

2. _____

_____

(Total 2 marks)

Q11.

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

1. _____

_____

2. _____

_____

(2)

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

_____

_____

(3)

(Total 5 marks)

Q12.

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

(2)

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

(5)

(Total 7 marks)

Q13.

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

_____

_____

_____

(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.

_____

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

Q14.

(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?

_____

_____

(1)

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

1. _____

_____

2. _____

_____

(2)

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

Name of disease: _____

How immunisation protects us: _____

_____

_____

_____

_____

(3)

(Total 8 marks)

Q15.

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?

_____

(1)

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

_____

_____

(2)

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

_____

(1)

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

_____

_____

(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.

(3)

(Total 8 marks)

Q16.

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.

(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.

(3)

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

(2)

(Total 8 marks)

Q17.

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.

(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?

(1)

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

_____

_____

(1)

(Total 4 marks)

Q18.

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)

_____

(1)

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

1. _____

_____

2. _____

_____

(2)

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

_____

_____

_____

_____

(2)

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

(2)

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

(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.

(3)

(Total 11 marks)

Q19.

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.

(Total 2 marks)

Q20.

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.

(Total 2 marks)

Q21.

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.

(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.

(2)

(Total 5 marks)

Mark schemes

Q1.

(a) antibiotics diffuse / pass (into agar)

*do **not** allow into dish*

1

kill / prevent growth of bacteria or destroy cell wall / bacteria

accept bacteria are dead

1

(b) it / higher concentration kills more bacteria **or** causes less growth

*do **not** accept anything referring to size of circle*

1

levels off (at 6 units)

accept above 4 units

1

(c) **Quality of written communication**:
for correct sequencing or linking of ideas or points

this mark can only be awarded for a plausible attempt (not necessarily biologically correct) to link a precaution to a purpose

Q ✓ or Q ✗

1

<u>Loop flamed</u>

to sterilise it / kill unwanted microorganisms

*accept so no bacteria present do **not** accept to clean it*

1

<u>Lid taped</u>

prevent bacteria getting in / out **or** prevent someone touching bacteria

accept microorganisms/fungi for bacteria
*do **not** accept viruses or germs*

1

<u>25°C</u>

prevents / reduces <u>growth</u> of / reproduction

1

harmful bacteria / microorganisms or pathogens

1

(d) any **two** from:

- to avoid over-use of antibiotics **or** use no / less / low concentration antibiotics
- select antibiotic that is most effective

- finish the course
- don't give or use for animals
- develop new antibiotics **or** alternatives

2

[11]

Q2.

(a) decrease in number of deaths (after vaccination started)

1

(b) <u>in correct sequence</u>:

bacteria

1

white blood cells

1

antibodies

1

[4]

Q3.

Quality of written communication

*for correct use of at least **two** scientific terms eg mutation, resistant (**not** just 'antibiotic-resistant', **not** 'immune') / selection / natural selection / survival / reproduction / gene / allele / DNA*

1

any **two** from:

mutation occurs in bacteria or change in DNA / gene occurs

cancel if mutation 'caused by' antibiotic

(when antibiotic used) only resistant bacteria survive **or** non-resistant bacteria are killed **or** reference to 'natural selection'

resistant bacteria pass on the gene / allele

allow pass on the mutation
*do **not** accept just 'pass on resistance'*

2

[3]

Q4.

(a) measles mumps rubella / German measles

any order

1

(b) **Quality of written communication**:

*for giving at least **two** statements linked to vaccination*

1

any **four** from:

*NB max **3** marks for only one side of argument*
*do **not** accept economic argument*

a valid reference to pain

eg pain of vaccination / disease

should

protect against diseases

measles / mumps / rubella are dangerous diseases / can cause lasting harm / death

cannot be treated by antibiotics

problem of epidemics

should not

may suffer autism / damage to mental / social development

may suffer large intestine disorders

separate vaccines available that cause no / less problems

4

[6]

Q5.

(i) the loop is sterilised

accept to <u>kill</u> anything on the loop

or
to kill any bacteria on it;

do not credit to clean the loop

1

(ii) if hot it would <u>kill bacteria picked up</u> (from culture);

accept 'microorganisms' or 'microbes'
accept entry of <u>contaminated</u> air but reject entry of air unqualified

1

(iii) to prevent entry (from the air) of unwanted bacteria or bacterial spores or fungal spores;

accept so can't breath on it
accept 'microorganisms' or 'microbes'

1

(iv) so that the (petri) dish is not opened (after bacteria are cultured)
or to reduce evaporation

or drying of the agar,

accept 'microorganisms' or 'microbes'

accept to prevent anything relevant getting in/out

reject references to spillage

1

[4]

Q6.

(a) antibodies;

if incorrect term used then penalise in (a) then regard as continuous error for rest of question

1

(b) antibodies remain (for several years)
or are not removed

*accept last a long time **or** not destroyed*
***or** continues to make antibodies*
***or** causes increased number of antibodies **or** more antibodies*
***or** stays in body **or** person has made own antibodies*
***or** if memory cells named must link to antibody production*

1

(c) antibodies removed (from blood);

*accept destroyed **or** unable to make **or** replace antibodies **or** they are not human antibodies **or** person has not made own antibodies*

1

(d) so more antibodies made;

accept so enough antibodies made
***or** so correct amount of antibodies present **or** to keep antibodies high*
***or** so body keeps making antibodies*

1

(e) any **two** from

already has tetanus bacteria in body;

*accept could boost infection **or** make it worse*

would take too long **or**
a long time for antibodies to be made;

accept too slow forming antibodies
***or** cannot form correct amount of antibodies*

disease would have effect before

antibodies made;

accept antibodies are specific
***or** will work for one disease but not another*

2 max

(f) injection of ready made antibodies;

*accept does not have to wait for antibody formation **or** has large amount of antibodies quickly*
***or** has enough antibodies quickly*
***or** antibodies start working straight away*

1

[7]

Q7.

(a) shape of antibody is not complementary;

*accept shapes of antibody and antigen do not match or antibody does not correspond to antigen **Y** **or** is not the same shape as antigen **Y** **or** antibody different shape*

1

so unable to attach or join to antigen **Y**

accept they do not fit

1

(b) (i) <u>antibodies</u> in blood or in skin or in body;

accept already have the antibodies

1

<u>react</u> with (injected) antigens or bacteria;

*accept skin affected by antigen-antibody complex **or** blood vessels <u>in skin</u> enlarge **or** dilate*

*do **not** accept attack instead of react*

1

(ii) any **three** from

bacteria weak so do not cause disease

accept not harmful

*do **not** accept bacteria are dead*

cause antibody production;

memory cells remain;

accept a suitable description

so body can quickly produce more antibodies in a real infection;

*accept antibodies remain in blood **or** in body*

3

[7]

Q8.

mutation or description of mutation (gives resistance to penicillin)

1

some survive (penicillin)

1

(survivors) reproduce **or** multiply

1

asexual reproduction **or** binary fission **or** cloning

accept mitosis

1

gene for resistance **or** the mutation is passed on (to offspring)

allow reference to bacteria being immune

ignore reference to survival of fittest

1

[5]

Q9.

(a) droplet infection **or** aerosol infection

*do **not** accept airborne*
accept airborne droplets

1

(b) so there is no large group which could catch the infection/pass on the infection

converse – if large numbers can't pass it on the virus is less likely to reach those few who are susceptible

1

(c) (i) any **four** of the following points:-

example of a 3 mark answer: Lymphocytes produce specific antibodies…...

comment on specificity applied to antibodies or lymphocytes

(recognition by) lymphocytes;

(white cells) make antibodies;

antibodies destroy/neutralise the virus/antigen/protein subunit;

*do **not** accept antibodies KILL viruses*
accept white blood cells replicate
accept some white cells form memory cells/live a long time;
accept subsequent infection results in very rapid antibody production;

max 4

(ii) active;

1

(d) any **three** of the following points

Structure change in:
protein for binding to host cell;
accept changes in surface proteins (of protein coat)

spike containing enzyme;
changes in antigen

Fit: existing/circulating/old antibodies don't match new virus strain shape/new antigen/new binding protein;

Wrong antibodies: injection does not stimulate antibodies against all strains/different antigens;
accept wrong antibodies for 1 mark

max 3

[10]

Q10.

blood clots to seal cuts;
kills microbes which enter
each for 1 mark
(allow higher level answers)

[2]

Q11.

(i) 2 of:
ingest microbes;)allow higher level answers
produce antibodies;)allow cause and effect
produce antitoxins)eg antitoxins neutralise poisons = 2
each for 1 mark

2

(ii) injection of dead/weak microbes;
stimulates antibody production;
these can be produced again quickly on new infection
or remain for long time to 'combat' new infection
each for 1 mark

3

[5]

Q12.

(a) use antibiotics; or named one to kill bacteria; (not microbes)
each for 1 mark

2

(b) some ingest/digest bacteria (not microbes) OWTTE
some produce antibodies;
which destroy bacteria/viruses;
some produce antitoxins;
which counteract poisons released by bacteria
each for 1 mark

5

[7]

Q13.

(a) engulf bacteria
produce antibodies
produce antitoxins
effect of antibodies/antitoxins
for 1 mark each

4

(b) method must be related to disease
dead/weakened microbes (as appropriate)
stimulate antibody production
antibody production rapid if microbe enters again
for 1 mark each

3

[7]

Q14.

(a) virus
bacteria (allow fungi, protozoa)

2

(b) reference to poisons/toxins produced by microbes

1

(c) 2 of e.g.
engulf microbes
produce antibodies
produce antitoxins

2

(d) dead/weakened microbes (relevant to named disease)
method e.g. injection/ swallowed (relevant to named disease)
body responds by producing antibodies

3

[8]

Q15.

(a) lungs
for 1 mark

1

(b) microbes reproduce rapidly produce poisons
for 1 mark each

2

(c) viruses/fungi/protozoa
for 1 mark

1

(d) more likely to come into contact with infected people/more TB bacteria in air

for 1 mark

1

(e) white cells ingest bacteria
produce antibodies which destroy bacteria
produce antitoxins which counteract poisons produced by bacteria

for 1 mark each

3

[8]

Q16.

(a) white cells ingest bacteria
produce antibodies which destroy bacteria
produce antitoxins which counteract poisons produced by bacteria

for 1 mark each

3

(b) dead/mild microbes
stimulate antibody production
white cells can quickly produce these again

for 1 mark each

3

(c) adds more bacteria (mild)
does not affect TB bacteria

for 1 mark each

2

[8]

Q17.

(a) microbes entered body,
multiplied rapidly,
made poisons

any 2 for 1 mark each

2

(b) contact with infected people

for 1 mark

1

(c) the body kills the microbes

for 1 mark

1

[4]

Q18.

(a) (i) white blood cells

for 1 mark

1

(ii) e.g. contact with infected person unhygienic conditions

for 1 mark each

2

(iii) broken down, by enzymes into amino acids

any 2 for 1 mark each

2

(b) reproduce rapidly produce toxins

for 1 mark each

2

(c) antibiotic or named

for 1 mark

1

(d) mild or deal microbes introduced white cells produce antibodies
which can destroy disease microbes
idea of memory cells
idea that injecting antibodies give immediate production

any 3 for 1 mark each

3

[11]

Q19.

bacteria reproduce rapidly / increase rapidly in numbers produce poisons / toxins

each for 1 mark

2

[2]

Q20.

bacteria reproduce rapidly / increase rapidly in numbers
produce poisons / toxins

each for 1 mark

[2]

Q21.

(a) **Quality of written communication**

The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme

idea of mutation ***or*** variation

*do **not** allow 'bacteria get used to antibiotics' **or** idea that antibiotics change the bacteria **or** 'bacteria become immune' **or** references to adaptation or evolution*

1

(resistant cells) survive antibiotic

1

(resistant cells) breed

1

(b) **EITHER** (yes)

keep animals disease free (1) so grow faster (1 mark) **or** live longer

OR (no)

resistant bacteria may develop (1)
risk to human **or** animal health (1)

allow bacteria become resistant / immune

2

[5]