AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.1.1

Communicable (infectious) diseases

Past-paper questions

Tier	**Higher**
Question groups	**33**
Available paper years	**2007–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.3.1.1 Communicable (infectious) diseases

Question 01

June 2007 | BLY1A | Original Q3 | Legacy

QUESTION THREE

Most infectious diseases can be prevented by vaccination.

3A What does a vaccine contain?

1 antibiotics

2 a mixture of toxins and antitoxins

3 dead or weakened microbes

4 white blood cells

3B Following a vaccination, the white cells produce . . .

1 antibiotics.

2 antibodies.

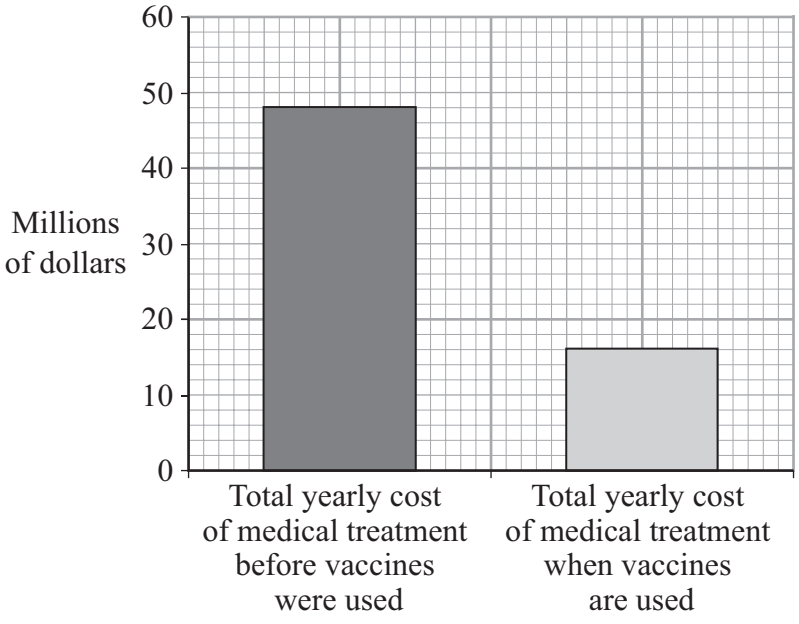
3 statins.

4 toxins.

4.3.1.1 Communicable (infectious) diseases

Question 01 · continued

The bar chart compares the total yearly cost of medical treatment for a disease in a country before vaccines were used and the total yearly cost when vaccines are used.



3C How much money is saved by the use of vaccines?

1 14 million dollars

2 16 million dollars

3 32 million dollars

4 48 million dollars

3D What is the most likely reason for the difference in cost?

1 Vaccines cure diseases.

2 Vaccines do not cost much to buy.

3 People who have been vaccinated never become ill.

4 People who have been vaccinated need less treatment in hospital.

4.3.1.1 Communicable (infectious) diseases

Question 02

June 2007 | BLY1H | Original Q4 | Legacy

4 Some diseases can be tackled by using antibiotics and vaccination.

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

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(2 marks)

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

Explain how the MRSA bacterium has developed resistance to antibiotics.

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(2 marks)

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

Explain how this makes the person immune to the disease.

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(3 marks)

7

4.3.1.1 Communicable (infectious) diseases

Question 03

March 2008 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

This question is about vaccination.

6A Which one of the following describes how vaccination helps to protect the body from disease?

1 It causes white blood cells to ingest pathogens.

2 It stimulates white blood cells to produce antibodies.

3 It prevents pathogens from multiplying.

4 It stimulates the white blood cells to produce toxins.

6B What is the main reason why some people refuse to be vaccinated against any disease-causing pathogen?

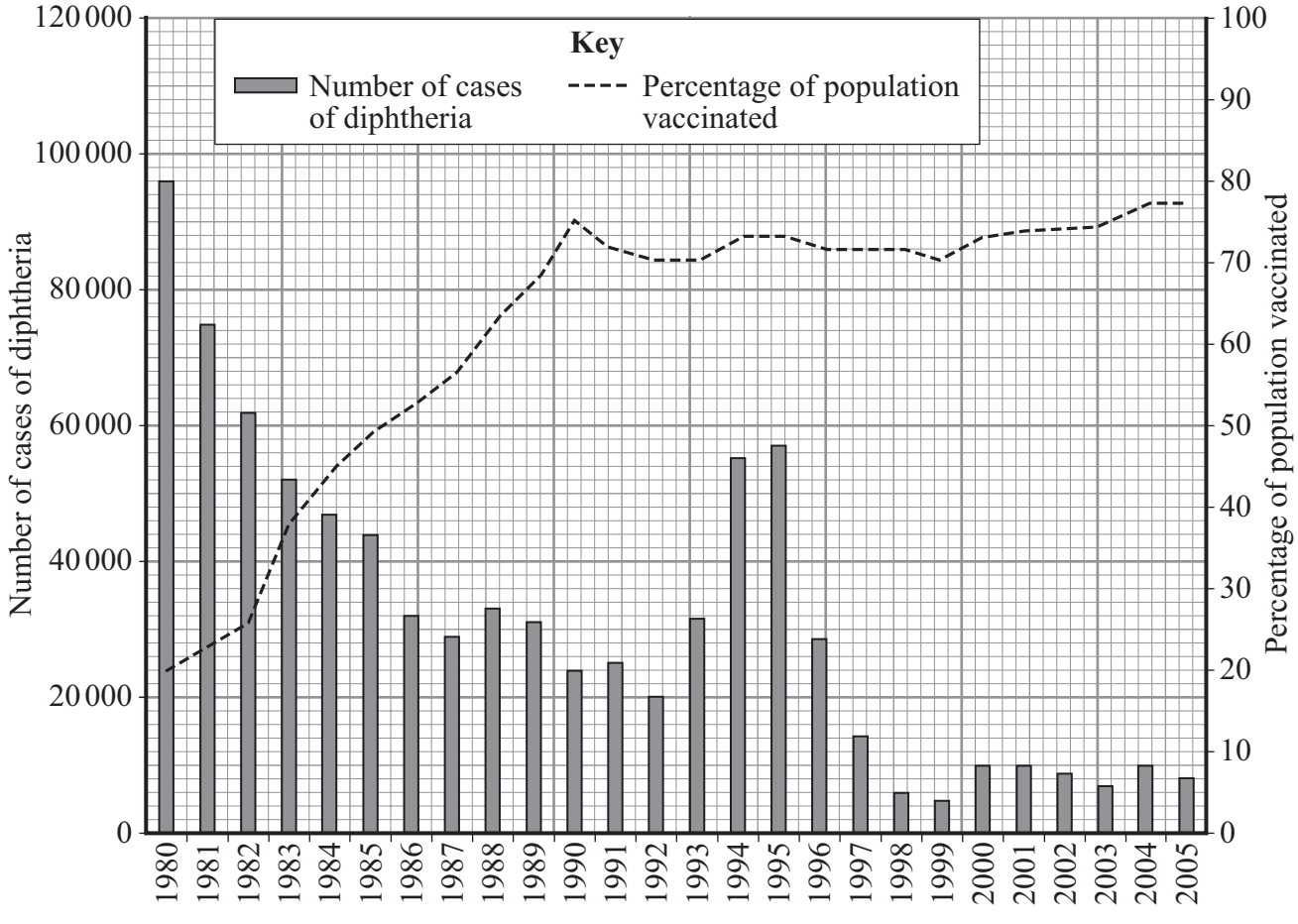
1 The way in which vaccines work is not understood.

2 The body can protect itself against diseases without vaccinations.

3 There are drugs that are effective in treating diseases caused by pathogens.

4 Some vaccines may have side effects.

The graph was produced by the World Health Organisation (WHO). It shows the number of cases of diphtheria and the percentage of the population vaccinated against diphtheria.



Source: adapted from World Health Organisation (WHO), www.who.int/en,2007

4.3.1.1 Communicable (infectious) diseases

Question 03 · continued March 2008 | BLY1AP | Original Q6 | Legacy

6C The graph shows that . . .

1 the higher the percentage of the population vaccinated, the fewer the number of cases of diphtheria.

2 increasing the percentage of the population vaccinated will eliminate diphtheria.

3 since 1990, the percentage of the population vaccinated has remained between 70% and 80%.

4 an increase of 20% of the population vaccinated reduces the number of cases of diphtheria by approximately 20 000.

6D What was the annual rate of decrease in the number of cases of diphtheria from 1980 to 1985?

1 8 600

2 8 800

3 10 400

4 52 000

4.3.1.1 Communicable (infectious) diseases

Question 04

June 2008 | BLY1H | Original Q4 | Legacy

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

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

Bacteria .....

.....

Viruses .....

.....

(2 marks)

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

Explain why.

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(2 marks)

4.3.1.1 Communicable (infectious) diseases

Question 04 · continued

for mark

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

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

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(4 marks)

8

4.3.1.1 Communicable (infectious) diseases

Question 05

November 2008 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

In the 1840s, many women died from infections after giving birth in hospitals.
The table shows data for two maternity wards in the same hospital over a two-year period.

	Ward P	Ward Q
Number of women who gave birth	296	308
Number of these women who died from infections	109	42

4A The number of women who survived in ward **Q** was . . .

1 42

2 187

3 266

4 350

4B A doctor called Semmelweiss noticed that medical students were delivering babies in ward **P** just after they had been dissecting corpses as part of their studies.
Only midwives delivered babies in ward **Q**.

Which is the best hypothesis to explain the higher death rate in ward **P**?

1 Students were carrying infections from corpses to women.

2 Midwives are better at delivering babies than students.

3 The higher number of deaths occurred by chance.

4 The women who gave birth in ward **P** were poorer than those in ward **Q**.

4.3.1.1 Communicable (infectious) diseases

Question 05 · continued

4C Semmelweiss instructed all medical students in the hospital to wash their hands thoroughly before treating patients.

Which row in the table shows the effect that this might have had on the death rate in the two wards?

	Death rate in ward P			Death rate in ward Q		
	Increase	**No change**	**Decrease**	**Increase**	**No change**	**Decrease**
1	✓				✓	
2		✓				✓
3			✓		✓	
4			✓	✓		

4D In the 1980s, antibiotics were often used to kill pathogens to prevent infections from spreading. However, antibiotics are now less effective than in the 1980s.

This is because . . .

1 medical staff do not wash their hands as often.

2 antibiotics have become useless against viruses.

3 mutations in bacteria have made them resistant to antibiotics.

4 people have become immune to antibiotics.

4.3.1.1 Communicable (infectious) diseases

Question 06

January 2009 | BLY1H | Original Q2 | Legacy

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

2 (a) Complete the sentences about vaccination.

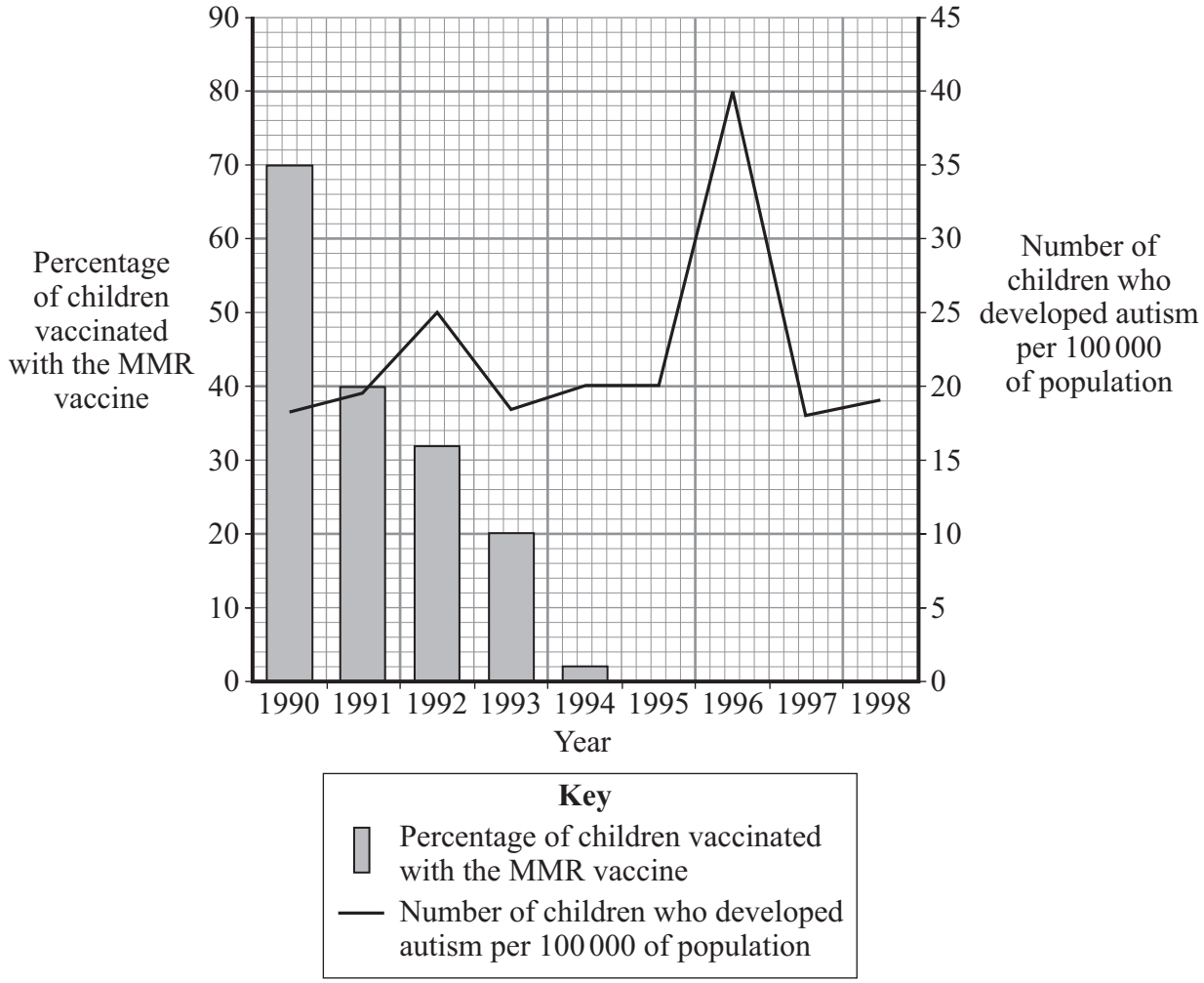
Vaccines stimulate white blood cells to produce ..... .

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

(2 marks)

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.



4.3.1.1 Communicable (infectious) diseases

Question 06 · continued

for mark

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

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(2 marks)

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

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

Explain the reason for your answer.

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(2 marks)

6

4.3.1.1 Communicable (infectious) diseases

Question 07

March 2009 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Influenza (flu) is caused by a virus.

8A Viruses can reproduce . . .

1 anywhere in the human body.

2 only in human lungs.

3 inside human cells.

4 on the surface of the human skin.

Bird flu virus does not normally infect humans. In 1997, one strain of bird flu, HN51, spread from infected chickens to 18 people in Hong Kong and killed 6 of them.

Since 2003 there have been over 300 cases of HN51 in humans. The World Health Organisation is worried that mutations of the HN51 virus will enable it to spread rapidly from human to human. Scientists believe that 13 different mutations of the HN51 virus will be required for it to transfer rapidly between humans. Up to now, two of these mutations have occurred.

8B Bird flu cannot be treated with antibiotics.

This is because . . .

1 white blood cells do not recognise the bird flu virus.

2 antibiotics only work in humans.

3 bird flu is caused by a virus.

4 antibiotics do not affect the toxins produced by the bird flu virus.

8C Which row of the table is correct?

	Statement	Reason
1	Human-to-human transfer of HN51 could cause millions of deaths.	It could be transferred rapidly between people living in cities.
2	Human-to-human transfer of HN51 will never occur.	The virus could never undergo enough mutations to make this possible.
3	It is not possible to vaccinate people against all strains of bird flu.	Vaccines damage body cells.
4	The World Health Organisation should ignore the possibility of a HN51 pandemic.	There have been very few cases of HN51 in humans.

4.3.1.1 Communicable (infectious) diseases

8D The success of vaccinating humans against HN51 may be limited because . . .

1 some people may catch HN51 from the vaccine.

2 HN51 mutates frequently.

3 vaccines are only effective against bacterial infections.

4 vaccines only work on certain people.

Turn over for the next question

4.3.1.1 Communicable (infectious) diseases

Question 08

June 2009 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

Bacteria and viruses cause disease in the human body.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A antibodies

B antitoxins

C pathogens

D toxins

Organisms that cause disease are called . . . **1** . . . .

To neutralise poisons, white cells produce . . . **2** . . . .

Bacteria make us feel unwell by producing . . . **3** . . . .

To kill bacteria, white cells produce . . . **4** . . . .

4.3.1.1 Communicable (infectious) diseases

Question 09

June 2009 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

Antibiotics are used to treat many types of infection.

6A Antibiotics kill . . .

1 bacteria only.

2 viruses only.

3 both bacteria and viruses.

4 all types of pathogens.

In recent years there has been a rapid increase in the number of infections in hospitals caused by antibiotic-resistant bacteria such as MRSA.

6B Bacteria such as MRSA have become resistant to antibiotics mainly because of . . .

1 overcrowding in hospitals.

2 lack of hand-hygiene amongst medical staff.

3 use of infected surgical instruments.

4 overuse of antibiotics.

6C Pathogens can be removed from hands by just washing them with soap and water.

The main advantage of this method, in terms of long-term infection control, is that . . .

1 it does not increase the proportion of antibiotic-resistant bacteria.

2 it is cheap.

3 it selectively kills the most dangerous types of bacteria.

4 soap has been used for many years with no resulting side effects.

4.3.1.1 Communicable (infectious) diseases

6D An antibiotic-resistant strain of a bacterium develops as a result of natural selection.

Natural selection means that . . .

1 doctors select which antibiotic to use against the bacterium.

2 only a selection of bacteria can infect the human body.

3 bacteria select the most suitable person to infect.

4 only successful bacteria survive to reproduce.

Turn over for the next question

4.3.1.1 Communicable (infectious) diseases

Question 10

November 2009 | BLY1AP | Original Q2 | Legacy

QUESTION TWO

The human body defends itself against diseases caused by microorganisms.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A antibodies

B antitoxins

C pathogens

D vaccines

Microorganisms that can cause diseases are called . . . **1** . . . .

To kill invading organisms, white blood cells produce . . . **2** . . . .

Poisons produced by microorganisms are neutralised by . . . **3** . . . .

Immunity to a disease can be achieved by using . . . **4** . . . .

4.3.1.1 Communicable (infectious) diseases

Question 11

November 2009 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Some pathogens cause epidemics and pandemics.

8A What is the difference between a pandemic and an epidemic?

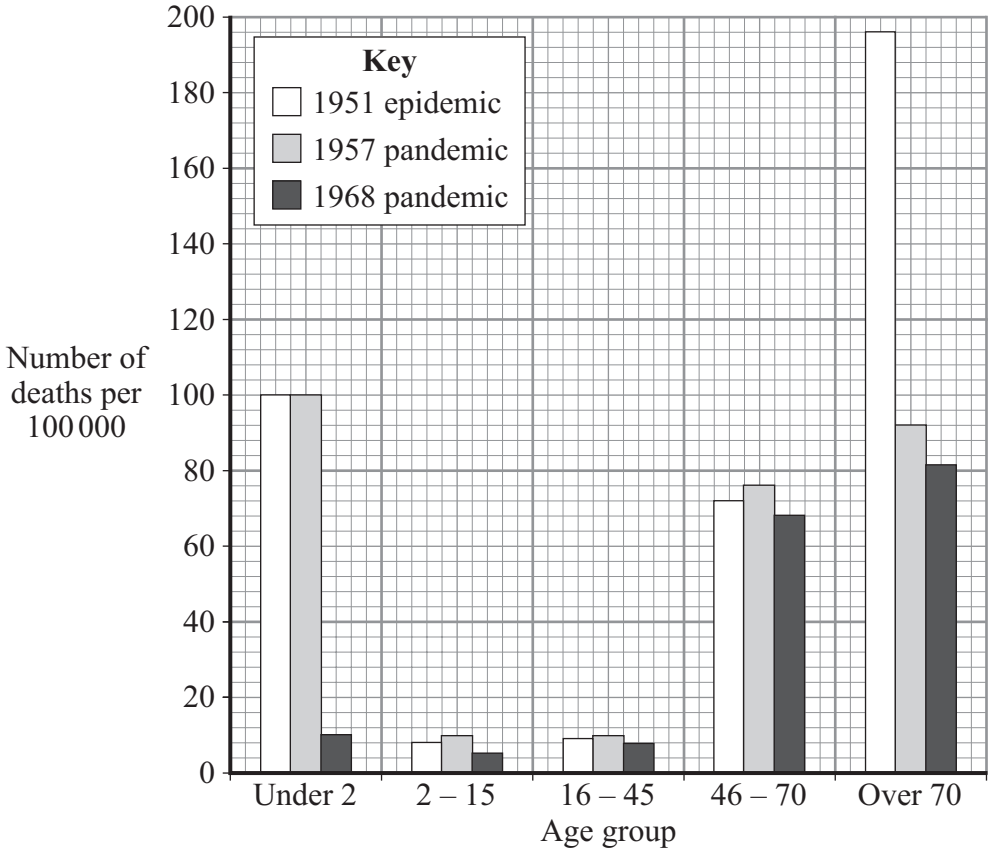
1 An epidemic results in more deaths.

2 A pandemic is caused by viruses and an epidemic is caused by bacteria.

3 Pandemics cause deaths over a wider area.

4 Only an epidemic is caused by a mutation in viruses or bacteria.

The bar chart shows the number of deaths per 100 000 people, due to influenza, in three different years.



4.3.1.1 Communicable (infectious) diseases

Question 11 · continued

8B How many deaths per 100 000 due to influenza in the 46 to 70 age group occurred in the 1951 epidemic?

1 68

2 70

3 72

4 76

8C What conclusion can be drawn from this data?

1 There is no link between age and the number of deaths due to influenza.

2 There were fewer deaths in the 1968 pandemic than in the 1957 pandemic and the 1951 epidemic.

3 In each of the three outbreaks, people over 70 have the highest death rate.

4 During the three outbreaks there were similar death rates for each age group.

8D If a person gets influenza, the body tries to defend itself.

Which of the following statements describes the body's response?

White blood cells . . .

1 produce antitoxins which destroy the pathogen.

2 produce antibiotics which destroy the pathogen.

3 ingest the pathogens.

4 produce antibodies which counteract the toxins.

4.3.1.1 Communicable (infectious) diseases

Question 12

March 2010 | BLY1AP | Original Q3 | Legacy

QUESTION THREE

Measles is a dangerous viral disease which kills about one person in every 1000 people infected. It gives long-term complications for many others. Worldwide, almost 350 000 people, mainly of school age, are killed by measles every year.

After a UK health scare, some parents refused to have their children vaccinated.

In England and Wales:

- in 2006 there were 756 cases of measles
- in 2007 there were 971 cases of measles
- in 2008 there were more than 1300 cases of measles.

3A Approximately how many people are **infected** by measles across the world each year?

1 971

2 350 000

3 350 000 000

4 It is impossible to tell from the data.

3B The rise in the number of people suffering from measles in the UK in recent years . . .

1 can be described as a pandemic.

2 is due to measles viruses mutating.

3 is due to antibiotic resistance.

4 can be described as an epidemic.

4.3.1.1 Communicable (infectious) diseases

Question 12 · continued

3C White blood cells can protect us from pathogens.

Which row in the table shows the way(s) in which this protection can occur?

	Ingesting pathogens	Producing antitoxins	Producing antibodies
1	✓	✓	✗
2	✓	✗	✓
3	✗	✓	✓
4	✓	✓	✓

3D School-age children are more likely to catch measles than adults.

This is because . . .

1 large numbers of children are often close together.

2 children have a poorly developed immune system.

3 the virus multiplies in the soil in playing fields.

4 new vaccines are less effective than older ones in protecting against measles.

4.3.1.1 Communicable (infectious) diseases

Question 13

March 2010 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

Some diseases are caused by viruses. Each type of virus only infects and causes the disease in one species of organism. One of the reasons for this is that a protein on the virus surface only matches with the cells of one particular species of organism.

9A Why does the flu virus make us feel ill?

1 The virus itself produces a toxin.

2 The virus damages the cells in which it reproduces.

3 The large number of viruses increases our temperature.

4 Viruses reproduce rapidly as soon as they are breathed in.

9B Bird flu is caused by a virus.

What might happen to the existing form of bird flu virus that would allow it to infect humans and cause flu in Britain?

1 an increase in the number of birds with the bird flu virus

2 a new strain of bird flu entering Britain

3 a change in the antibody which the bird flu virus carries

4 a change in the protein on the virus surface

Question 13 · continued

Humans produce antibodies against viruses.

A scientist investigated the effect of a virus infection on the antibody concentration in a person's blood.

The person was infected by day 3.

Time in days	**1**	**4**	**7**	**10**	**13**	**16**	**19**	**22**	**25**
Antibody concentration in mg per 100 cm^3 of blood	5.1	6.0	10.4	35.9	55.9	50.2	48.8	32.7	10.0

9C Which conclusion can be drawn from the data?

1 This virus did not reproduce until the 10th day.

2 Antibody production by the body continues to rise until the patient recovers.

3 The patient had recovered by the 25th day.

4 Antibody production by the body rises to a peak after an infection and then declines.

9D Another scientist repeated the investigation but could not measure the antibody concentration directly. Instead, he made measurements using a blood cell counter. He counted the white blood cells using a microscope with an automatic cell counter. A colleague said that he would not trust this data as much as measuring the antibody concentration with a machine.

Which of the reasons below best accounts for his colleague's attitude?

1 There is no relationship between the number of white cells and the concentration of antibodies.

2 Counting white cells is a less sensitive method than measuring antibody concentration with a machine.

3 The antibody measuring machine is more expensive to buy and run.

4 Reading the cell counter is less accurate than reading the scale on the antibody machine.

END OF TEST

4.3.1.1 Communicable (infectious) diseases

Question 14

June 2010 | BLY1AP | Original Q3 | Legacy

QUESTION THREE

Our bodies defend themselves against attack by pathogens.

3A Our white cells produce antibodies which destroy . . .

1 all types of bacteria and all types of viruses.

2 all types of bacteria but no viruses.

3 all types of viruses but no bacteria.

4 some types of bacteria and some types of viruses.

3B Our white cells also produce antitoxins which . . .

1 counteract poisons produced by pathogens.

2 destroy both bacteria and viruses.

3 destroy bacteria but not viruses.

4 ingest pathogens.

3C Antibiotics destroy . . .

1 all types of bacteria and all types of viruses.

2 some types of bacteria and some types of viruses.

3 some types of bacteria but no viruses.

4 some types of viruses but no bacteria.

3D Vaccines . . .

1 can be made from dead pathogens.

2 can give protection against bacteria but not viruses.

3 can give protection against viruses but not bacteria.

4 destroy pathogens.

4.3.1.1 Communicable (infectious) diseases

Question 15

June 2010 | BLY1H | Original Q3 | Legacy

3 Influenza is an infectious disease. The influenza virus often mutates. This has made the World Health Organisation worried about another influenza *pandemic*.

3 (a) What is meant by a *pandemic*?

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(1 mark)

3 (b) Explain why a mutation of the influenza virus might cause another influenza pandemic.

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(3 marks)

4

4.3.1.1 Communicable (infectious) diseases

Question 16

March 2011 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

Read the newspaper article published in 2009.

Swine Flu: How Serious a Threat?

The World Health Organisation says that a new strain of virus, the swine flu virus, has killed 150 people in Mexico. This shows that the virus can pass from human to human. One expert says that he expects the outbreak to develop into a pandemic.

4A A pandemic is an outbreak of a disease . . .

1 confined to a town.

2 confined to a region.

3 that will **not** spread.

4 that will spread all over the world.

4B The swine flu virus makes us ill because the virus . . .

1 produces antibodies.

2 produces toxins.

3 reproduces rapidly.

4 slows down our reactions.

4C The swine flu virus made many people ill because . . .

1 people were **not** immune to the swine flu virus.

2 painkillers do **not** work on viral diseases.

3 scientists had **not** produced a new antibiotic.

4 new strains of a virus are always more powerful than existing strains.

4.3.1.1 Communicable (infectious) diseases

Question 16 · continued

4D Scientists have developed a swine flu vaccine.

This vaccine works because it . . .

1 destroys the virus.

2 produces antitoxins.

3 engulfs the virus.

4 stimulates the production of antibodies.

Turn over for the next question

4.3.1.1 Communicable (infectious) diseases

Question 17

June 2011 | BLY1H | Original Q3 | Legacy

3 The body's immune system protects us from disease.

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

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(4 marks)

4

4.3.1.1 Communicable (infectious) diseases

Question 18

November 2011 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Doctors disagree about whether children should be given the MMR vaccine or whether children should be vaccinated against the three diseases separately.

Each method of vaccination needs a booster injection.

MMR vaccination therefore requires two injections.

Vaccinating for the three diseases separately requires six injections.

8A Vaccinating a child to give protection against a particular disease involves . . .

1 causing the child to get the disease so that the child can develop antibodies.

2 injecting dead pathogens or inactive pathogens.

3 injecting the correct antibodies.

4 injecting white blood cells to produce the correct antibodies.

8B Vaccination gives a child protection from later infection by a particular pathogen because . . .

1 the vaccine causes the production of relevant antitoxins.

2 pathogens can no longer enter the body.

3 the body rapidly produces the correct antibodies if infected again.

4 the vaccine is toxic to pathogens entering the body.

8C Which of the following is a valid reason, based on fact, for supporting the use of MMR vaccinations in preference to the three separate vaccinations?

1 By 1995, 90 countries were using MMR vaccinations.

2 MMR vaccinations are compulsory in the USA.

3 Separate vaccinations require six injections with various time intervals; MMR needs only two.

4 Every MMR vaccination results in a severe reaction straight after the injection.

4.3.1.1 Communicable (infectious) diseases

Question 18 · continued

8D Many parents are worried about the perceived risks associated with MMR.

Which of the following facts is most likely to help parents decide to have their children vaccinated with MMR?

1 Child death rates from measles fell by 60 % between 1999 and 2007 following a widespread programme of MMR vaccinations.

2 Some parents have reported reactions which they believe to be related to the MMR vaccine 3 years after it was given to their children.

3 Doctors cannot guarantee that an MMR vaccination will give 100 % protection against the three diseases.

4 Swaziland does not use MMR and had no cases of measles reported in 2005.

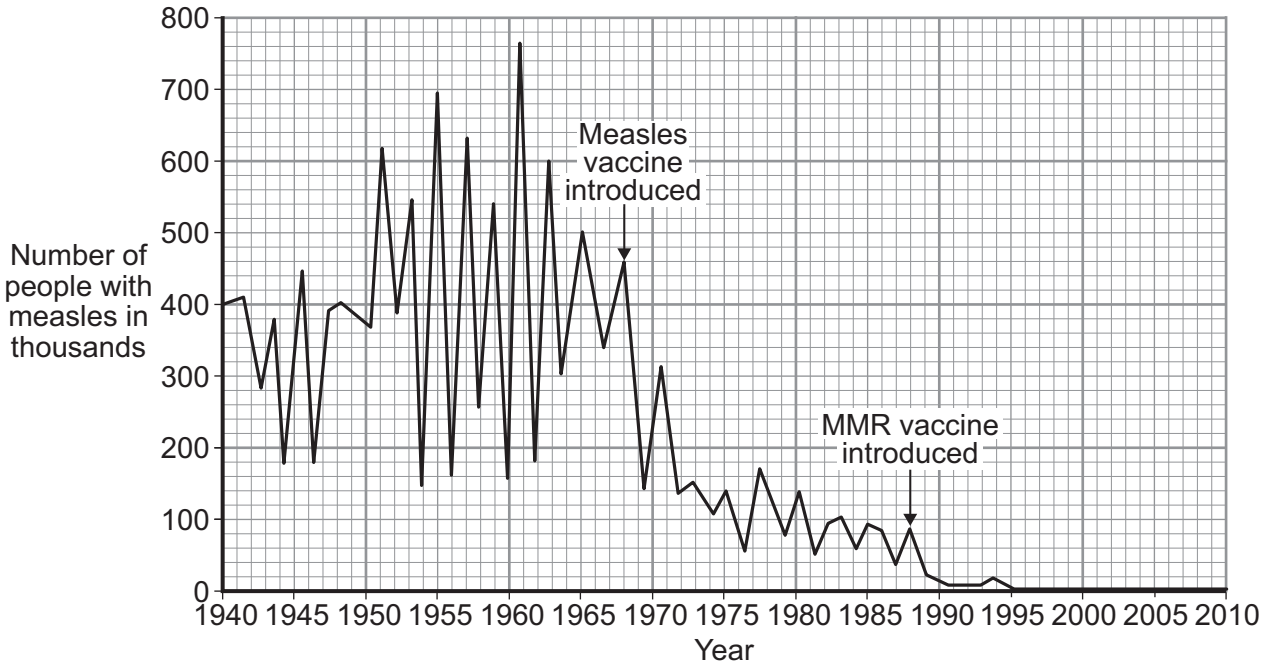
Turn over for the next question

4.3.1.1 Communicable (infectious) diseases

Question 19

January 2012 | BL1HP | Original Q2 | Legacy

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



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

Use data from the graph.

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(3 marks)

4.3.1.1 Communicable (infectious) diseases

Question 19 · continued

2 (b) The MMR vaccine was introduced in 1988.

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

1 ..... 2 .....

(2 marks)

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.

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(3 marks)

8

4.3.1.1 Communicable (infectious) diseases

Question 20

June 2012 | BL1HP | Original Q1 | Legacy

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

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

Why?

.....

(1 mark)

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.

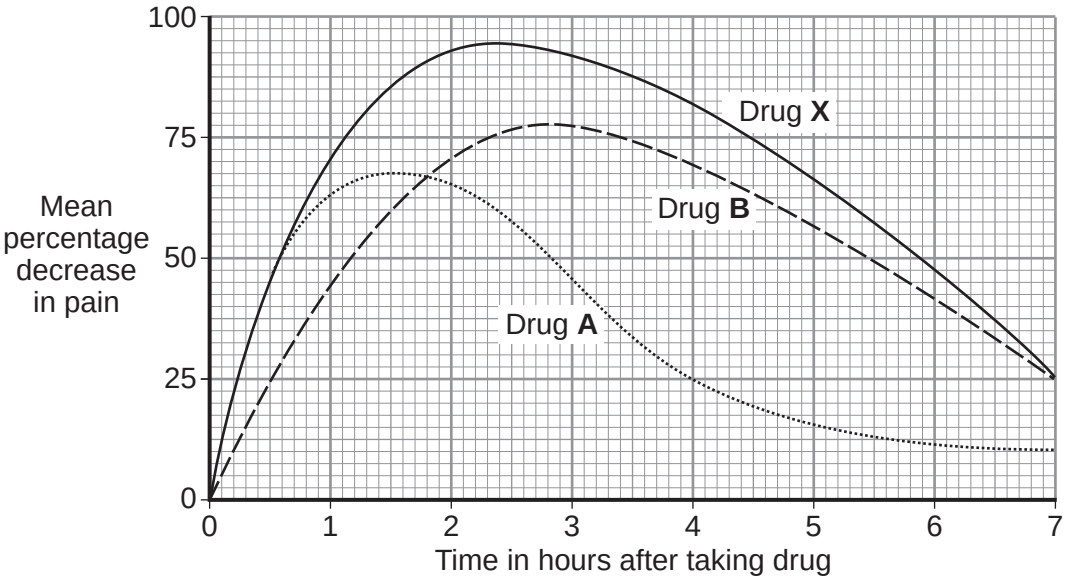
Suggest **two** of the factors that should be matched.

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(2 marks)

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



4.3.1.1 Communicable (infectious) diseases

Question 20 · continued

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

..... percent
(1 mark)

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

.....

.....
(1 mark)

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

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(2 marks)

1 (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.

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(3 marks)

10

4.3.1.1 Communicable (infectious) diseases

Question 21

June 2012 | BL1HP | Original Q5 | Legacy

5 People may be immunised against diseases using vaccines.

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

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(2 marks)

5 (a) (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.

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(3 marks)

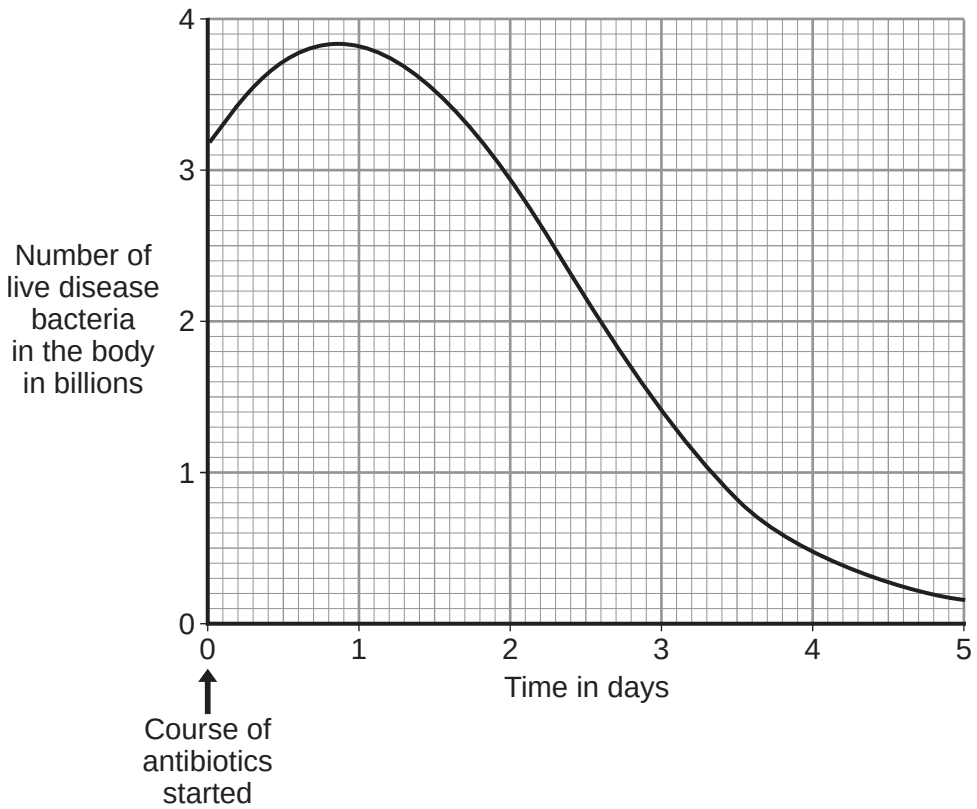
Question 5 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 21 · continued

5 (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.



4.3.1.1 Communicable (infectious) diseases

Question 21 · continued

5 (b) (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 marks)

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

The new strain may spread rapidly.

Explain why.

.....

.....

.....

.....

.....

.....

(3 marks)

10

4.3.1.1 Communicable (infectious) diseases

Question 22

January 2013 | BL1HP | Original Q6 | Legacy

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

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

Give **one** reason why.

.....

.....

(1 mark)

6 (a) (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 marks)

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

6 (b) (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?

.....

.....

.....

.....

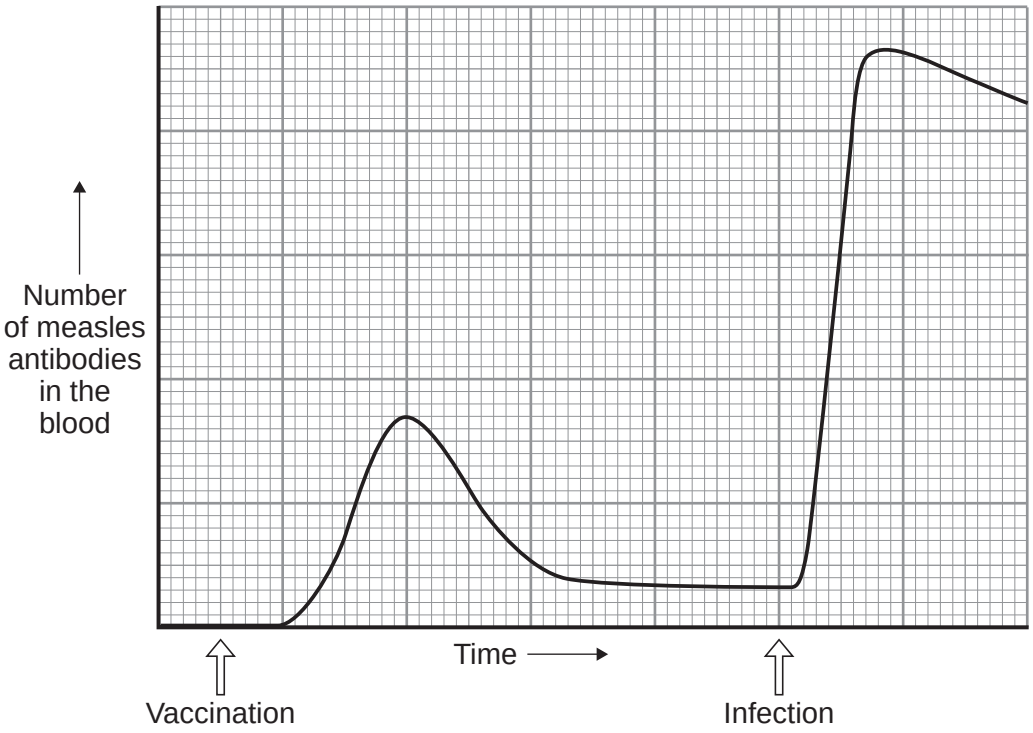
(2 marks)

6 (b) (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.

4.3.1.1 Communicable (infectious) diseases

Question 22 · continued



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 marks)

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

Why?

.....

(1 mark)

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

.....

(1 mark)

10

4.3.1.1 Communicable (infectious) diseases

Question 23

June 2013 | BL1HP | Original Q1 | Legacy

1 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.

1 (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 marks)

4.3.1.1 Communicable (infectious) diseases

Question 23 · continued

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

.....

.....

.....

.....

(2 marks)

1 (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 marks)

Question 1 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 23 · continued

1 (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 marks)

9

4.3.1.1 Communicable (infectious) diseases

Question 24

June 2015 | BL1HP | Original Q4 | Legacy

4 Antibiotics can be used to protect our bodies from pathogens.

4 (a) What is a pathogen?

[1 mark]

.....

.....

4 (b) Bacteria may become resistant to antibiotics.

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

[2 marks]

.....

.....

.....

.....

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

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

Draw a ring around the correct answer.

[1 mark]

25 °C **40 °C** **100 °C**

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

[1 mark]

.....

.....

5

4.3.1.1 Communicable (infectious) diseases

Question 25

June 2017 | BL1HP | Original Q6 | Legacy

6 (a) Tuberculosis (TB) is an infectious disease caused by a bacterium.

A person can be vaccinated against TB.

The vaccine contains the TB bacterium.

6 (a) (i) Describe the difference between the bacteria in the vaccine and the bacteria that cause the disease.

[1 mark]

6 (a) (ii) **Table 3** shows antibody production in a non-vaccinated person and a vaccinated person when infected with TB bacteria.

Table 3

	Number of antibodies produced	Speed of antibody production
Non-vaccinated person	Few	Slow
Vaccinated person	Many	Very fast

Explain the differences in antibody production shown in **Table 3**.

[2 marks]

4.3.1.1 Communicable (infectious) diseases

Question 25 · continued

6 (b) Bacteria may mutate and become resistant to an antibiotic.

Table 4 shows how the percentages of non-resistant and resistant strains in the population of bacteria change over time when an antibiotic is used.

Table 4

Number of generations of bacteria	Percentage (%) in population of bacteria	
	Non-resistant strain	Resistant strain
5	99	1
50	95	5
500	80	20
5 000	60	40
50 000	30	70

6 (b) (i) Why does the percentage of the resistant strain in the population of bacteria change?

[3 marks]

6 (b) (ii) Suggest why antibiotics should **not** be used to treat some people who have sore throats.

[2 marks]

8

4.3.1.1 Communicable (infectious) diseases

Question 26

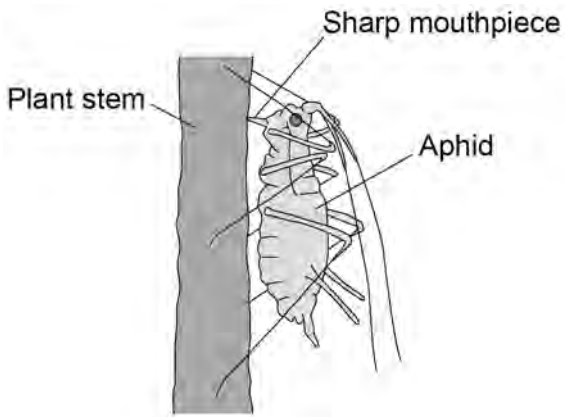
June 2018 | 8461/1H | Original Q5

0 5 Plants can be infected by fungi, viruses and insects.

Aphids are small insects that carry pathogens.

Figure 6 shows an aphid feeding from a plant stem.

Figure 6



0 5 . 1 An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

Give the reason why the mouthpiece of an aphid contains a high concentration of dissolved sugars after feeding.

[1 mark]

Question 5 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 26 · continued

0 5 . 2 Plants infected with aphids may show symptoms of magnesium deficiency.

Magnesium deficiency symptoms include:

- yellow leaves
- stunted growth.

Explain how a deficiency of magnesium could cause these symptoms.

[5 marks]

4.3.1.1 Communicable (infectious) diseases

Question 26 · continued

0 5 . 3 A farmer thinks a potato crop is infected with potato virus Y (PVY).

The farmer obtains a monoclonal antibody test kit for PVY.

To make the monoclonal antibodies a scientist first isolates the PVY protein from the virus.

Describe how the scientist would use the protein to produce the PVY monoclonal antibody.

[4 marks]

10

4.3.1.1 Communicable (infectious) diseases

Question 27

June 2019 | 8461/1H | Original Q2

0 2 Mosquitoes carry a pathogen that causes malaria.

0 2 . 1 What type of pathogen causes malaria?

[1 mark]

Tick (✓) **one** box.

A bacterium ☐

A fungus ☐

A protist ☐

A virus ☐

Mosquito nets can help prevent the spread of malaria.

Table 1 shows the results of a study in one area of Africa.

Table 1

Total number of people in the study	Number of people who use mosquito nets when sleeping	Percentage of people with malaria	
		Who use mosquito nets when sleeping	Who do NOT use mosquito nets when sleeping
476	426	1.2	40

A newspaper made the following statement:

'Study shows mosquito nets are scientifically proven to prevent malaria.'

0 2 . 2 Give **one** piece of evidence that supports the statement.

[1 mark]

4.3.1.1 Communicable (infectious) diseases

Question 27 · continued

0 2 . 3 Suggest **one** reason why the statement may **not** be valid.

[1 mark]

Table 2 shows information about the number of deaths from malaria in the same area of Africa.

Table 2

Year	Number of deaths from malaria per 100 000 people
2005	161
2007	136
2009	114
2011	97
2013	94
2015	92

0 2 . 4 Predict the number of people per 100 000 who died from malaria in 2017 if the trend stayed the same.

[1 mark]

Number of people per 100 000 = _____

0 2 . 5 Use of mosquito nets has helped to reduce the number of deaths from malaria each year.

Suggest **one** other reason for the reduced number of deaths from malaria each year.

[1 mark]

4.3.1.1 Communicable (infectious) diseases

Question 27 · continued

0 2 . 6 Describe how the human body:

- prevents pathogens from entering
- defends itself against pathogens inside the body.

[6 marks]

11

4.3.1.1 Communicable (infectious) diseases

Question 28

November 2020 | 8461/1H | Original Q7

0 7 Monoclonal antibodies (mAbs) are usually made using mouse lymphocytes.

Candida albicans infection produces serious symptoms in patients with a poor immune system.

Recently scientists have produced mAbs to *Candida albicans* using human lymphocytes produced naturally after an infection.

0 7 . 1 *Candida albicans* lives in the throat of infected patients.

A sample is taken from the throat of a patient with a suspected *Candida albicans* infection.

The sample is transferred onto a microscope slide.

Describe how the mAbs and a fluorescent dye could be used to see any *Candida albicans* pathogens on the slide.

[3 marks]

4.3.1.1 Communicable (infectious) diseases

Question 28 · continued

In a laboratory the human lymphocyte mAbs were injected into animals infected with *Candida albicans*.

The mAbs caused increased phagocytosis of the *Candida albicans* pathogens.

Doctors intend to start a trial to give the mAbs to patients severely ill with *Candida albicans.*

0 7 . 2 Explain how increased phagocytosis of the *Candida albicans* pathogen will help the patient.

[2 marks]

Question 7 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 28 · continued

0 7 . 3 It has been shown that this mAbs treatment is effective in the laboratory using both:

- infected tissue culture cells
- infected live animals.

The mAbs treatment for *Candida albicans* is now ready for clinical trials on people.

Describe how the clinical trials should be carried out.

[6 marks]

4.3.1.1 Communicable (infectious) diseases

Question 28 · continued

0 7 . 4 Scientists have also used human lymphocytes to make mAbs to other pathogens and to some types of cancer cells.

Suggest **one** reason why these new mAbs have been more successful in treating diseases in humans than mAbs made using mice.

[1 mark]

12

4.3.1.1 Communicable (infectious) diseases

Question 29

June 2022 | 8461/1H | Original Q7

0 7 Human immunodeficiency virus (HIV) is a pathogen.

0 7 . 1 Give **one** way HIV can spread from one person to another person.

[1 mark]

Table 8 shows information about new cases of HIV diagnosed in the UK.

Table 8

Year	Number of new HIV cases in women	Number of new HIV cases in men
2010	376	2266
2012	361	2310
2014	397	2370
2016	298	1886
2018	242	1288

0 7 . 2 Describe the trends shown in **Table 8** between 2010 and 2018.

[2 marks]

0 7 . 3 Suggest **one** reason for the change in the number of new HIV cases between 2014 and 2018.

[1 mark]

4.3.1.1 Communicable (infectious) diseases

Question 29 · continued

0 7 . 4 Calculate the ratio of new cases of HIV in women to new cases of HIV in men in 2018.

Give your answer to 3 significant figures.

[3 marks]

Ratio (3 significant figures) = _____ : 1

0 7 . 5 In the UK population the total number of women is greater than the total number of men.

The data in **Table 8** is used to compare the proportions of new cases of HIV in the population for men and women.

Suggest how the data could be presented differently so that a more valid comparison can be made.

[1 mark]

Question 7 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 29 · continued

Scientists have been working to produce a vaccine for HIV for many years.

0 7 . 6 Explain how a vaccine for HIV could work to prevent a person developing HIV infection.

[4 marks]

A person with late stage HIV infection has AIDS.

Scientists have produced monoclonal antibodies for HIV.
The monoclonal antibodies can prevent a person infected with HIV developing AIDS.

0 7 . 7 Describe how the monoclonal antibody for HIV can be produced.

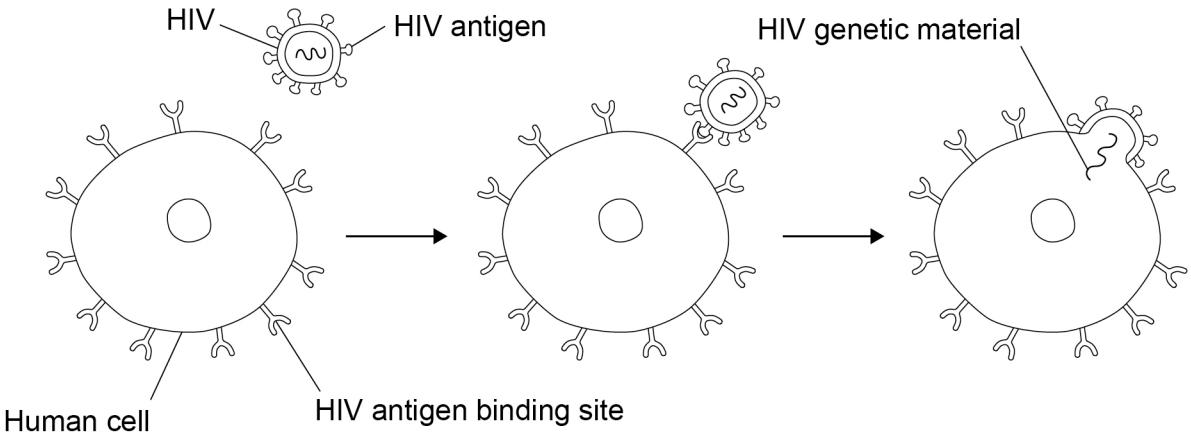
[4 marks]

4.3.1.1 Communicable (infectious) diseases

Question 29 · continued

0 7 . 8 **Figure 9** shows how HIV enters a human cell.

Figure 9



Suggest how the monoclonal antibody for HIV helps to prevent a person infected with HIV developing AIDS.

Use information from **Figure 9**.

[3 marks]

19

4.3.1.1 Communicable (infectious) diseases

Question 30

June 2023 | 8461/1H | Original Q3

0 3 *Salmonella* bacteria cause outbreaks of food poisoning in humans.

To prevent food poisoning in humans, farmers vaccinate their animals against *Salmonella* bacteria.

0 3 . 1 How do *Salmonella* bacteria in food cause the symptoms of vomiting and diarrhoea?

[1 mark]

During a food poisoning outbreak, scientists identified the farm where the food came from.

The farmer had **not** vaccinated the farm animals against *Salmonella* bacteria.

0 3 . 2 The food poisoning outbreak could have been prevented if the farm animals had been vaccinated.

Explain how:

- the immune systems of animals respond to a vaccination
- the immune response in farm animals prevents an outbreak of food poisoning in humans.

[4 marks]

Question 3 continues on the next page

Most cases of food poisoning do **not** need to be treated with antibiotics.

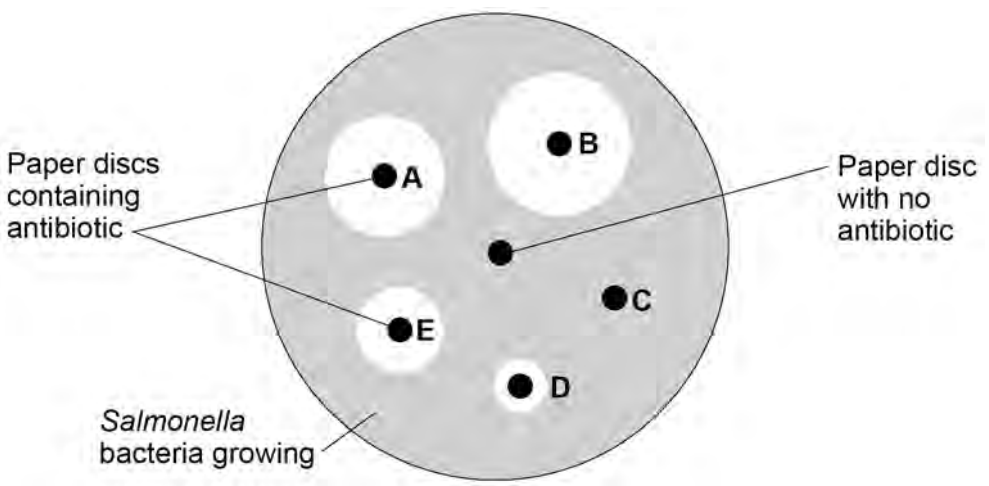
However, some patients may need to take antibiotics to recover.

Scientists investigated the effectiveness of five different antibiotics on the *Salmonella* bacteria in the outbreak.

Antibiotics **A**, **B**, **C**, **D** and **E** were used in the investigation.

Figure 4 shows the results.

Figure 4



0 3 . 3 Describe **two** aseptic techniques the scientists should have used in the investigation.

[2 marks]

1 _____

_____

2 _____

_____

4.3.1.1 Communicable (infectious) diseases

Question 30 · continued

0 3 . 4 The scientists incubated the bacteria at 37 °C.
Students in school laboratories incubate bacteria at 25 °C.

Explain why scientists use 37 °C but students must use 25 °C to incubate bacteria.

[3 marks]

0 3 . 5 What is the purpose of the paper disc with no antibiotic in **Figure 4**?

[1 mark]

0 3 . 6 The scientists concluded that either antibiotic **A** or antibiotic **B** should be prescribed to patients with food poisoning.

Why should antibiotic **A** or antibiotic **B** be prescribed?

[1 mark]

0 3 . 7 The scientists wanted to be more certain about which antibiotic should be prescribed.

Describe how the results in **Figure 4** could be used to obtain a **quantitative** comparison of antibiotics **A** and **B**.

[1 mark]

4.3.1.1 Communicable (infectious) diseases

Question 30 · continued

0 3 . 8 One year later, there was another outbreak at the farm involving *Salmonella* bacteria.

Antibiotic **B** did **not** have an effect.

Suggest why antibiotic **B** no longer had an effect.

[1 mark]

0 3 . 9 Antibiotics treat food poisoning because they kill *Salmonella* bacteria inside the human body.

Some antibiotics work because they damage the bacterial cell wall.

The bacteria die because the cells burst.

Explain why the cells burst.

[3 marks]

17

4.3.1.1 Communicable (infectious) diseases

Question 31

June 2023 | 8461/1H | Original Q5

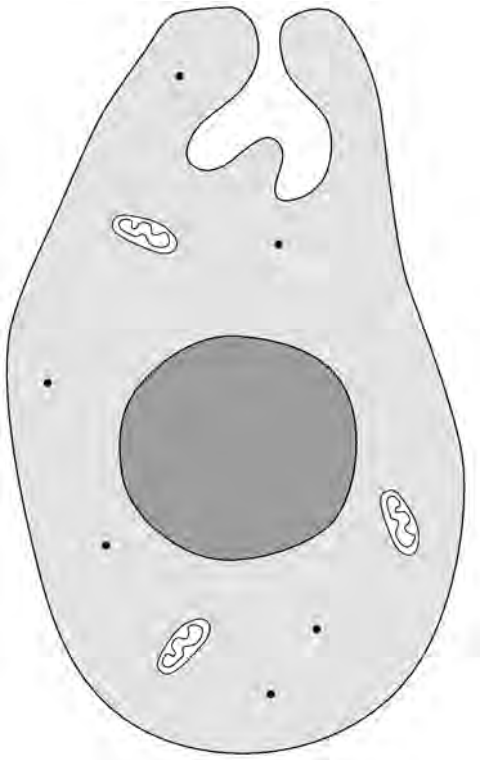
0 5 The protist that causes malaria is passed from one person to another person by mosquitos.

0 5 . 1 What term describes an organism that passes a pathogen from one person to another person?

[1 mark]

0 5 . 2 **Figure 7** shows the malarial protist.

Figure 7



4.3.1.1 Communicable (infectious) diseases

Question 31 · continued

The malarial protist is a eukaryotic cell.

Describe **three** ways the structure of the malarial protist is different from the structure of a prokaryotic cell.

Do **not** refer to size in your answer.

[3 marks]

1 _____

2 _____

3 _____

0 5 . 3 During one stage of malaria infection, the malarial protists enter red blood cells and cause them to burst.

Explain why the bursting of red blood cells causes tiredness.

[2 marks]

_____

_____

_____

_____

Question 5 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 31 · continued

0 5 . 4 The malarial protist reproduces sexually and asexually during a life cycle.

Complete **Table 3** to give **three** differences between sexual reproduction and asexual reproduction.

[3 marks]

One difference has been completed for you.

Table 3

	Sexual reproduction	Asexual reproduction
	Involves two parents	Involves one parent
1		
2		
3		

0 5 . 5 One drug for treating malaria prevents mitosis occurring in the malarial protist.

The drug stops the synthesis of new DNA bases in the cell.

Suggest how the drug prevents mitosis occurring.

[1 mark]

4.3.1.1 Communicable (infectious) diseases

Question 31 · continued

0 5 . 6 Describe the process of cell division by mitosis.

[3 marks]

Question 5 continues on the next page

0 5 . 7 Different types of disease may interact.

Scientists studied the incidence of malaria infections in children:

- with disorder **S**
- without disorder **S**.

The incidence of malaria in children with disorder **S** was calculated as a percentage of the incidence in children without disorder **S**.

Table 4 shows the results.

Table 4

Age in years	Calculated percentage (%) incidence of malaria in children with disorder S
2 to < 4	69
4 to < 6	63
6 to < 8	50
8 to 10	45
> 10	73

Describe what the results in **Table 4** show about the interaction between disorder **S** and malaria.

[2 marks]

15

4.3.1.1 Communicable (infectious) diseases

Question 32

June 2024 | 8461/1H | Original Q6

0 6 This question is about pathogens.

A scientist investigated antibiotic resistance in bacteria.

0 6 . 1 Name **one** antibiotic.

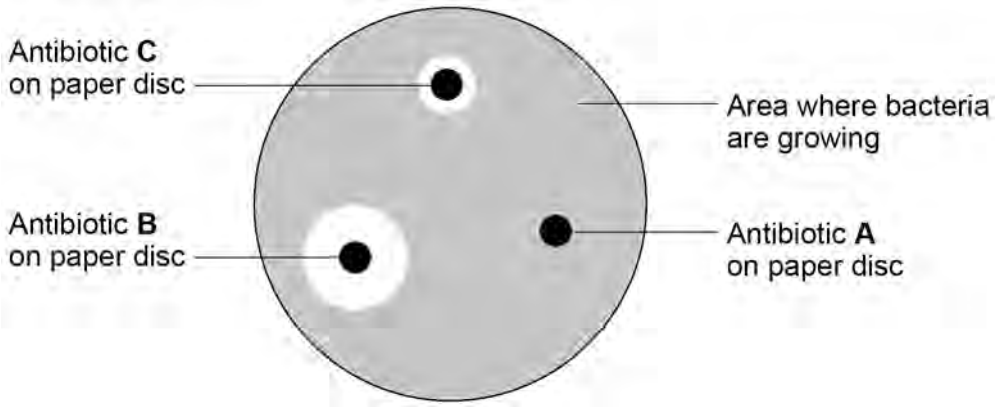
[1 mark]

The scientist grew one type of bacterium on agar in a Petri dish.

The scientist placed paper discs each containing a different antibiotic on the agar.

Figure 5 shows the appearance of the Petri dish after 2 days.

Figure 5



4.3.1.1 Communicable (infectious) diseases

Question 32 · continued

0 6 . 2 A student said:

'The bacterium is resistant to antibiotic **C**.'

Explain how the results in **Figure 5** show that the student is **not** correct.

[2 marks]

0 6 . 3 Suggest why doctors are concerned about antibiotic resistance.

[2 marks]

Question 6 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 32 · continued

Diseases caused by viruses **cannot** be treated using antibiotics.

0 6 . 4 Suggest why viruses **cannot** be grown on agar.

[1 mark]

0 6 . 5 Why is it difficult for scientists to develop drugs to destroy viruses?

[1 mark]

0 6 . 6 Which disease is caused by a virus that damages white blood cells?

[1 mark]

Tick (✓) **one** box.

- AIDS ☐
- Gonorrhoea ☐
- Measles ☐
- Salmonella ☐

8

4.3.1.1 Communicable (infectious) diseases

Question 33

June 2025 | 8461/1H | Original Q1

0 1 Measles is an infectious disease caused by a pathogen.

0 1 . 1 What type of pathogen causes measles?

[1 mark]

0 1 . 2 Give **one** way measles is spread from one person to another person.

[1 mark]

0 1 . 3 One symptom of measles is pain.

In adults, aspirin can be used to treat the pain.

Which plant did aspirin originate from?

[1 mark]

0 1 . 4 Give **one** other symptom of measles.

Do **not** refer to pain in your answer.

[1 mark]

4.3.1.1 Communicable (infectious) diseases

Question 33 · continued

The spread of measles can be reduced by vaccination.

0 1 . 5 Explain why vaccinating large numbers of children helps to reduce the spread of the measles pathogen in the population.

[2 marks]

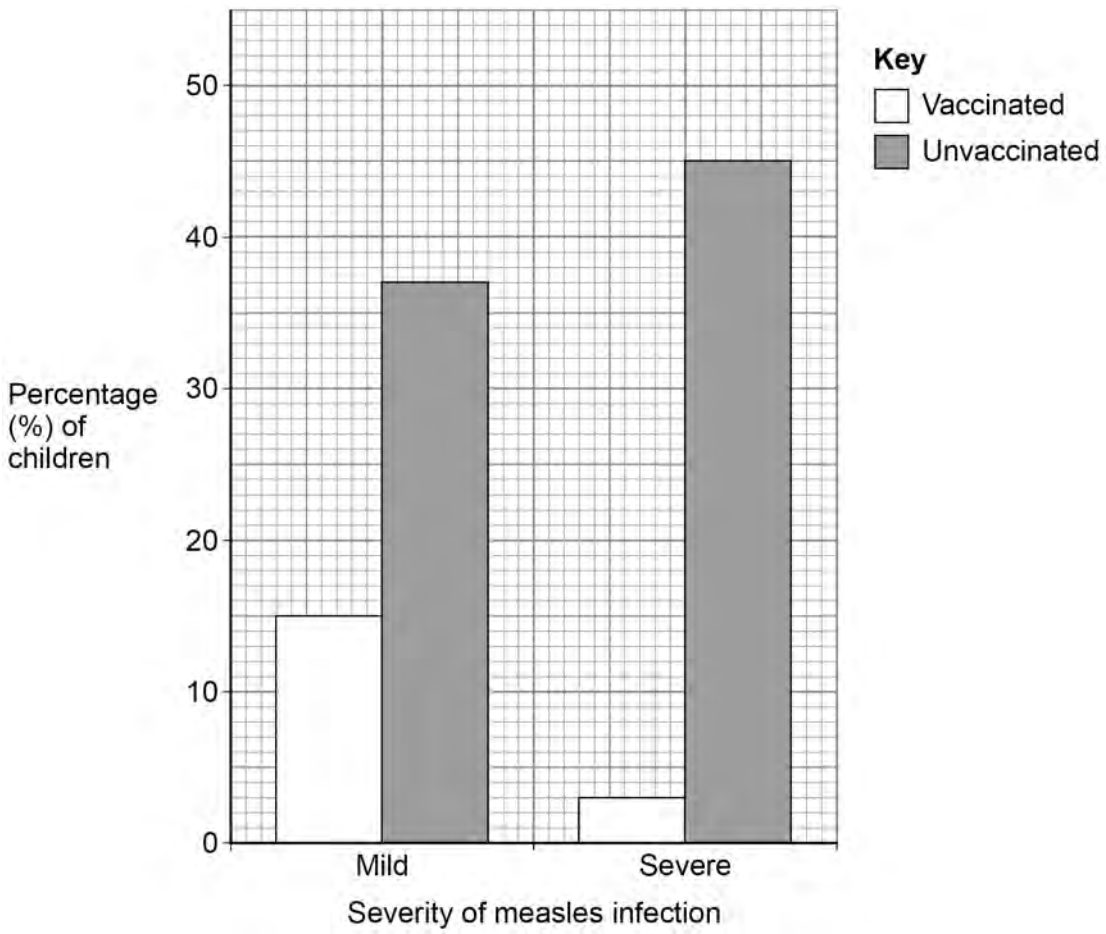
Question 1 continues on the next page

4.3.1.1 Communicable (infectious) diseases

Question 33 · continued

Figure 1 shows information about the severity of measles infection in vaccinated and unvaccinated children.

Figure 1



0 1 . 6 There were 240 children in the survey.

Calculate how many **unvaccinated** children had a severe measles infection.

Use **Figure 1**.

[3 marks]

Number of unvaccinated children = _____

4.3.1.1 Communicable (infectious) diseases

Question 33 · continued

0 1 . 7 It is recommended that all children are given a measles vaccination.

Give evidence from **Figure 1** to support the recommendation.

Include data from **Figure 1** in your answer.

[2 marks]

11

Turn over for the next question