AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.1.7

Vaccination

Past-paper questions

Tier	**Higher**
Question groups	**31**
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.

4.3.1.7 Vaccination

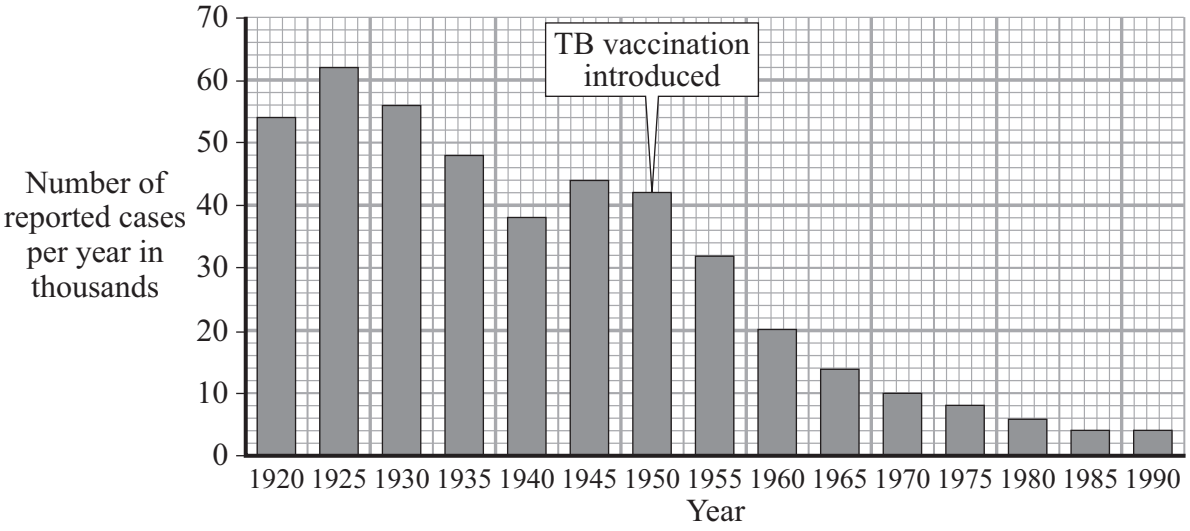
Question 01

March 2007 | BLY1A | Original Q3 | Legacy

QUESTION THREE

Tuberculosis (TB) is a disease caused by a bacterium.

The bar chart shows the number of reported cases of TB from 1920 to 1990.



3A What was the maximum number of reported cases of TB in a year during the period from 1920 to 1990?

1 60

2 62

3 44 000

4 62 000

4.3.1.7 Vaccination

Question 01 · continued

3B The number of cases of TB decreased after the introduction of vaccination.

Vaccination may not have been the only reason for this decrease.

What evidence from the graph suggests that there may have been other reasons?

1 The number of cases decreased between 1925 and 1940.

2 The number of cases decreased between 1950 and 1990.

3 The number of cases decreased very rapidly between 1950 and 1960.

4 The number of cases increased between 1940 and 1950.

3C The TB vaccination causes . . .

1 red blood cells to produce antibodies.

2 white blood cells to produce antibodies.

3 white blood cells to produce toxins.

4 white blood cells to stop producing antitoxins.

3D TB is spread by breathing in infected droplets which have been coughed out by infected people.

Which of the following is **least** likely to reduce the spread of TB?

1 isolating people with the disease

2 vaccinating all adults

3 vaccinating all children

4 vaccinating people who have the disease

4.3.1.7 Vaccination

Question 02

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.

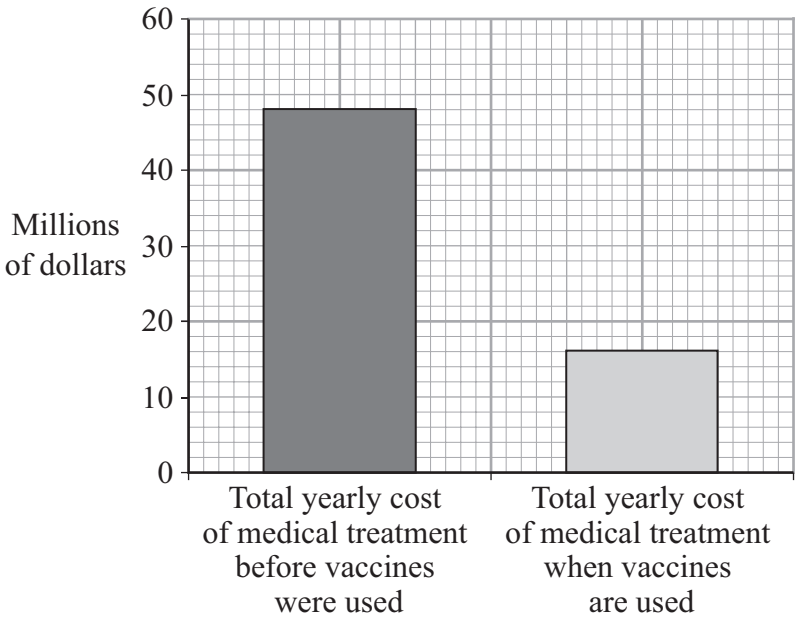
3 statins.

4 toxins.

4.3.1.7 Vaccination

Question 02 · 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.

4.3.1.7 Vaccination

Question 03

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.

.....

.....

.....

.....

(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.

.....

.....

.....

.....

(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.

.....

.....

.....

.....

.....

.....

(3 marks)

7

4.3.1.7 Vaccination

Question 04

November 2007 | BLY1A | Original Q6 | Legacy

QUESTION SIX

This question is about hormones and contraception.

6A Which line in the table is correct?

	FSH	Oestrogen
1	secreted by the pituitary gland	stimulates FSH production
2	causes eggs to mature	secreted by the pituitary gland
3	stimulates production of oestrogen	secreted by the ovaries
4	used in oral contraceptives	causes eggs to mature

6B Which of the following is true of the hormone LH?

1 The production of LH is stimulated by FSH.

2 It is produced by the ovary.

3 The production of LH is stimulated by a hormone from the ovaries.

4 It is used in contraceptive pills.

6C There are several types of contraceptive pill available for women.
One type of contraceptive pill contains oestrogen.

What is the effect of this type of contraceptive pill?

1 It inhibits the production of FSH.

2 It prevents a fertilised egg from implanting in the womb.

3 It prevents LH production.

4 It reduces the number of eggs released at ovulation.

4.3.1.7 Vaccination

6D The contraceptive pill has been linked to cervical cancer.
However, it is believed that most cases of cervical cancer are linked to a virus, HPV.
A new vaccine has been produced to combat HPV.

This vaccine . . .

1 will contain dead or weakened HPV viruses.

2 will contain antibodies against the HPV virus.

3 will destroy the HPV virus.

4 will cause the body to produce antibiotics.

Turn over for the next question

4.3.1.7 Vaccination

Question 05

November 2007 | BLY1A | Original Q7 | Legacy

QUESTION SEVEN

Some people believe that there is a link between the MMR vaccine and diseases such as autism.

7A What is the MMR vaccine?

1 a vaccine for measles, meningitis and rubella

2 a vaccine for measles, mumps and rubella

3 a vaccine for meningitis, mumps and rubella

4 a vaccine for mumps, measles and rabies

7B When someone is given the MMR vaccine, . . .

1 the white blood cells ingest the pathogens.

2 the white blood cells neutralise the toxins in the vaccine.

3 the white blood cells produce antibodies against the pathogen.

4 the white blood cells reproduce rapidly.

4.3.1.7 Vaccination

Question 05 · continued

Read the passage.

> A study in Denmark looked at the health of 444 000 children who had received the MMR vaccine and 100 000 children who had not.
>
> The results of the study were published in a medical journal and found no causal link between the MMR vaccine and whether the child suffered from autism.
>
> However, a government spokesman stated that, 'Strongly held beliefs are difficult to change as objective data is not likely to put an end to the controversy.'
>
> A department of health spokeswoman said: 'This large study from Denmark, carried out by independent researchers and published in an internationally respected journal of medicine, adds to the increasing body of research which has found no link between the MMR vaccine and autism.'

7C What is meant by 'no causal link' in this passage?

1 The MMR vaccine does **not** give anyone autism.

2 Children with autism are likely to have had the MMR vaccine.

3 More studies need to be carried out in order to establish whether there is a definite link between the MMR vaccine and autism.

4 People with autism should **not** be given the MMR vaccine.

7D Which part of the study is likely to reduce the influence of bias on the results?

1 544 000 children were studied.

2 The research was independent of the companies which produce the vaccine.

3 The results were published in an internationally respected journal of medicine.

4 Strongly held beliefs are difficult to change, despite new objective data.

4.3.1.7 Vaccination

Question 06

January 2008 | BLY1H | Original Q5 | Legacy

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

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

.....

.....

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.....

.....

(3 marks)

(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.

4.3.1.7 Vaccination

Question 06 · continued

BLANK

Use information from the passage on the opposite page to answer these questions.

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

Explain the reasons for your answer.

.....

.....

.....

.....

(2 marks)

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

Give the reason for your answer.

.....

.....

.....

(1 mark)

6

4.3.1.7 Vaccination

Question 07

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?

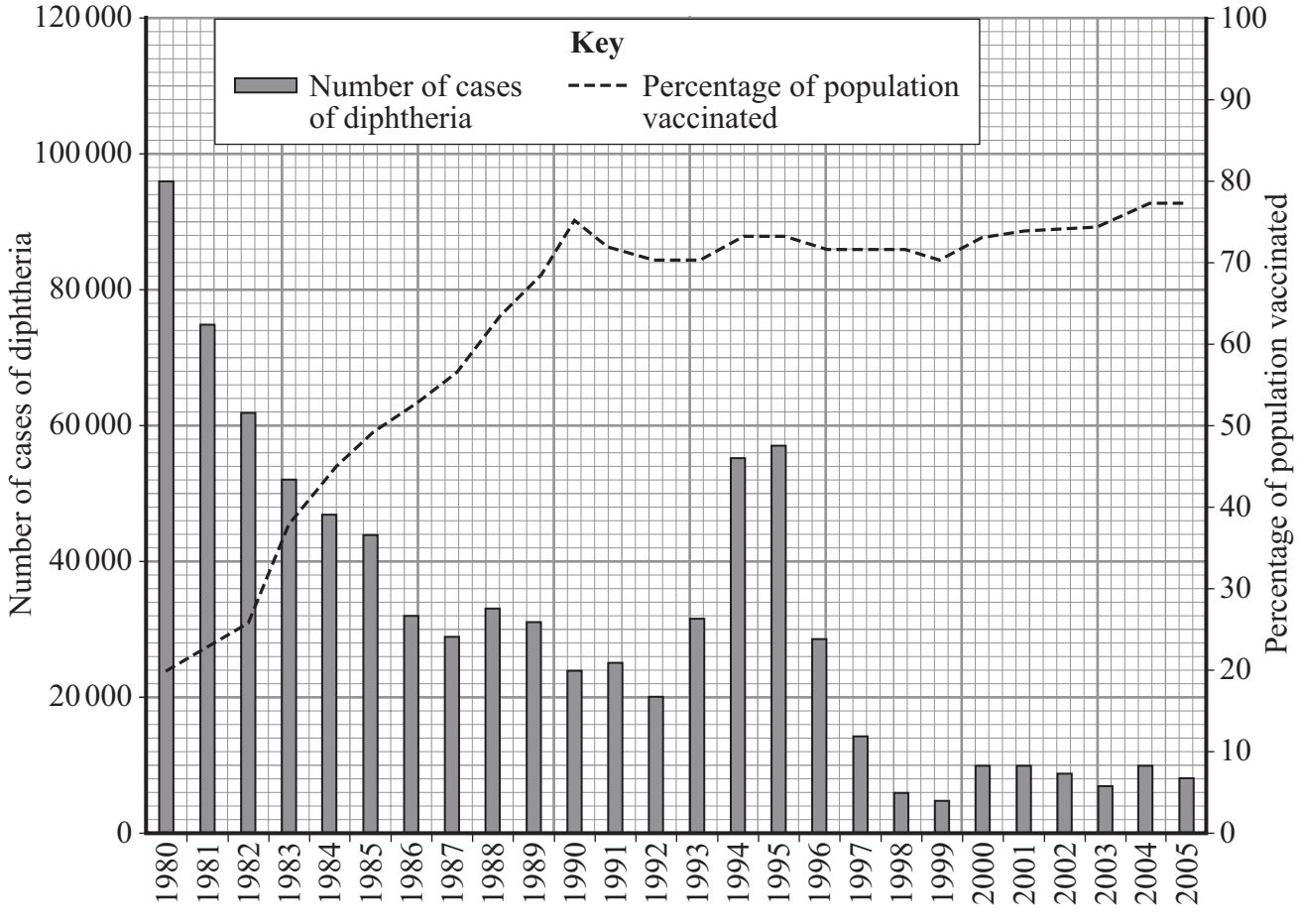
1 The way in which vaccines work is not understood.

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

4.3.1.7 Vaccination

Question 07 · 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

4.3.1.7 Vaccination

Question 08

June 2008 | BLY1AP | Original Q1 | Legacy

QUESTION ONE

Our bodies defend themselves naturally against infections. We also use other methods to protect ourselves against infections and to relieve the symptoms of disease.

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

A antibiotics

B painkillers

C antibodies

D vaccines

1	given to people to provide immunity
2	medicines that kill bacteria
3	produced by white blood cells
4	relieve symptoms of disease

4.3.1.7 Vaccination

Question 09

June 2008 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

Measles is now an uncommon disease because millions of children have been given the MMR vaccine. The MMR vaccine is still used even though cases of measles are rare.

8A Measles vaccine contains . . .

1 antibodies.

2 antitoxins.

3 white blood cells.

4 a weakened virus.

8B If a child catches measles and then recovers, that child will **not** catch measles again because . . .

1 the child can be vaccinated.

2 the virus can no longer enter the body.

3 white blood cells will quickly produce the same antibodies again.

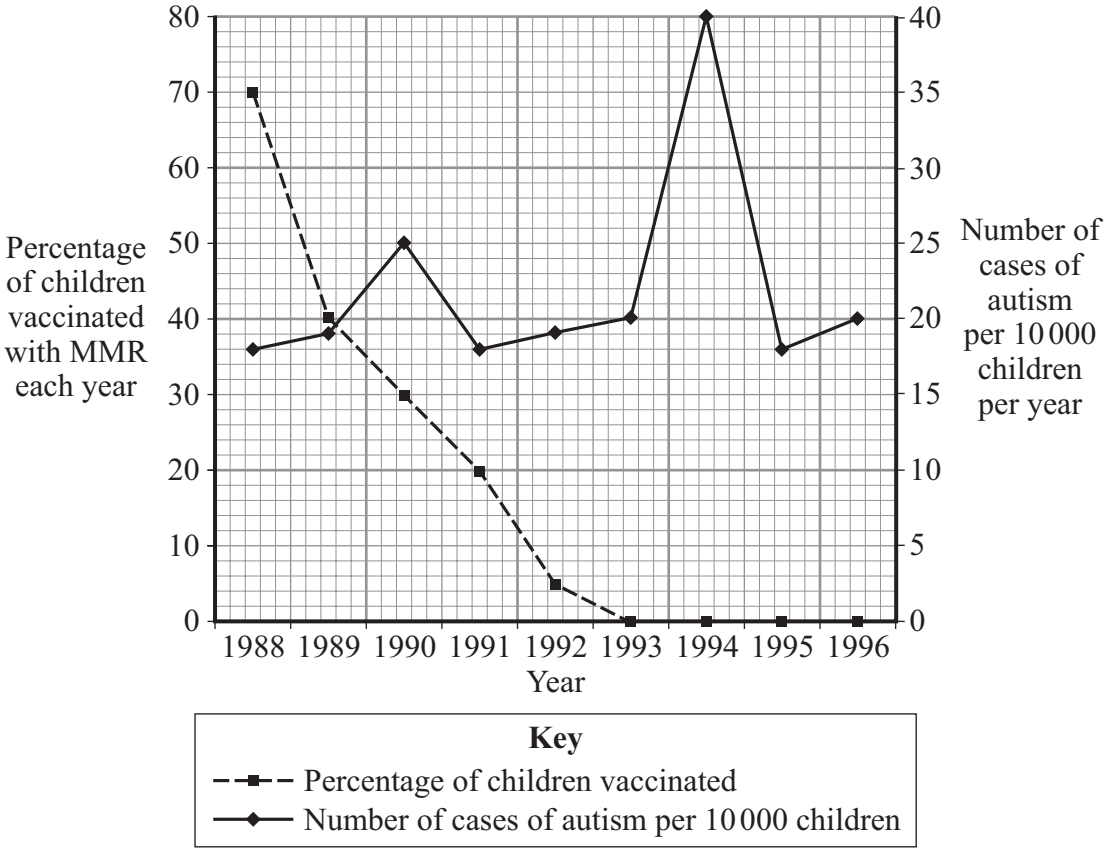
4 white blood cells will surround the virus.

4.3.1.7 Vaccination

Question 09 · continued June 2008 | BLY1AP | Original Q8 | Legacy

MMR vaccination began in Japan in 1988. There was concern about a possible link between MMR and autism, so MMR vaccination ended in 1993.

The graph shows the percentage of children who were vaccinated with MMR and the number of children who developed autism.



8C How many cases of autism would be expected in a city with a population of 50 000 children in 1990?

1 25

2 30

3 125

4 250

8D Does the data in the graph suggest that the MMR vaccine was causing autism?

1 yes, because the number of cases of autism falls as the vaccination rate falls

2 yes, because the rate of autism rises even when there was no MMR given

3 no, because the two graphs cross in 1989

4 no, because the rate of autism rises after the MMR vaccination had stopped

4.3.1.7 Vaccination

Question 10

November 2008 | BLY1AP | Original Q5 | Legacy

QUESTION FIVE

Read the information about whooping cough.

- Whooping cough is a harmful disease which can damage the lungs.
- Whooping cough is often caught in childhood.
- Whooping cough can be treated with antibiotics.

5A Whooping cough is . . .

1 caused by bacteria.

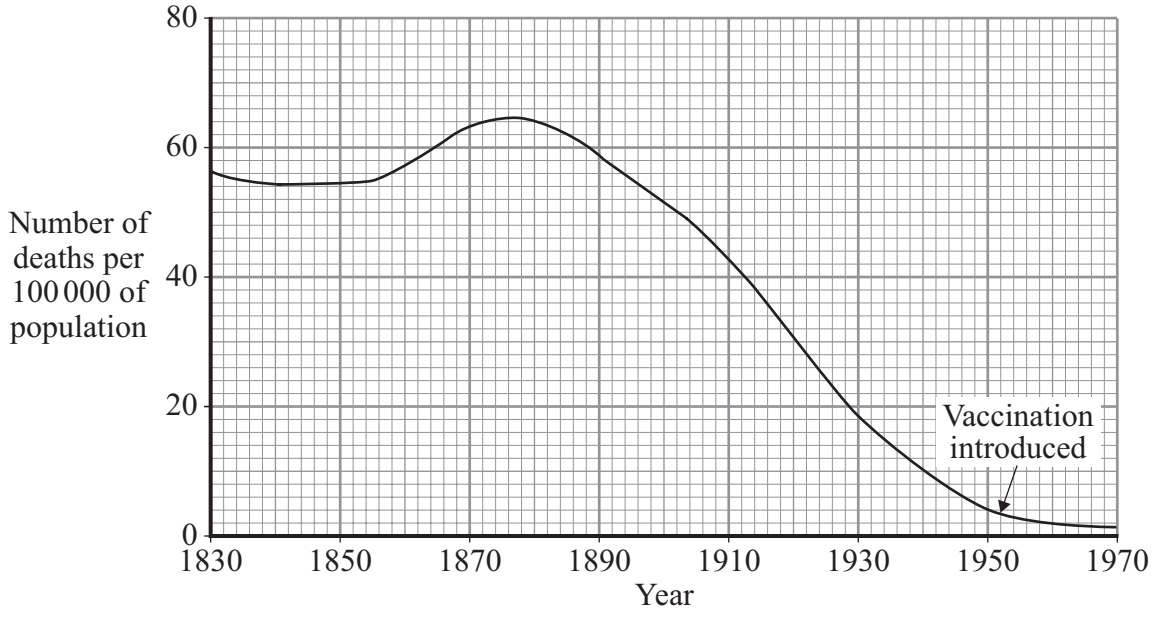
2 caused by smoking.

3 caused by a virus.

4 a deficiency disease.

Graph 1 shows the number of deaths due to whooping cough in England and Wales between 1830 and 1970.

Graph 1



5B In 1950, the population of England and Wales was 45 million.

How many people died from whooping cough in England and Wales in 1950?

1 180

2 1800

3 18 000

4 180 000

4.3.1.7 Vaccination

Question 10 · continued

5C A whooping cough vaccine was introduced in 1952.

From the information in the graph, what was the most likely reason for the changes in the number of deaths after 1950?

1 improved standards of hygiene

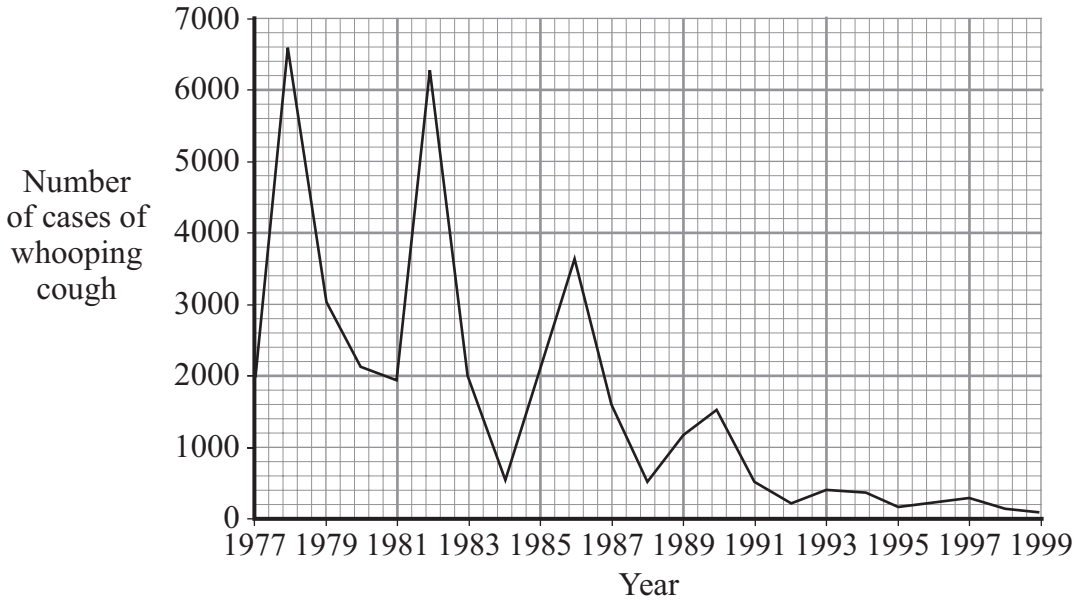
2 antibiotic resistance

3 better education

4 vaccination

5D **Graph 2** shows information about the number of cases of whooping cough in England and Wales after 1977.

Graph 2



What conclusion can be drawn from the data?

1 Deaths from whooping cough were much higher in 1982 than in 1882.

2 Cases of whooping cough occurred in four-year cycles between 1977 and 1993.

3 Whooping cough had been wiped out in England and Wales by 1999.

4 Cases of whooping cough and time are directly related.

4.3.1.7 Vaccination

Question 11

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.

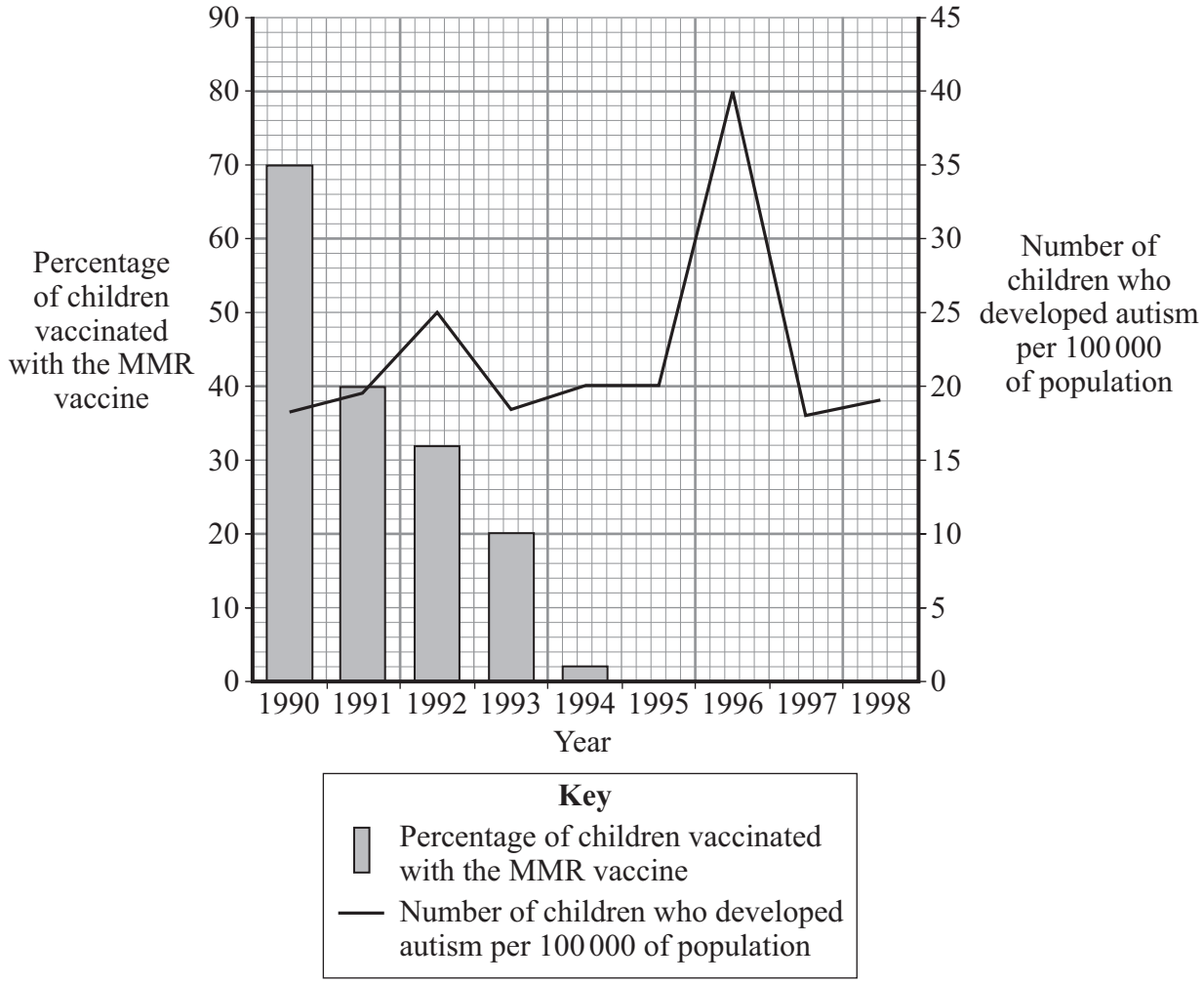
Vaccines stimulate white blood cells to produce ..... .

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.



4.3.1.7 Vaccination

Question 11 · continued

for mark

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

.....

.....

.....

.....

.....

(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.

.....

.....

.....

.....

.....

(2 marks)

6

4.3.1.7 Vaccination

Question 12

March 2009 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

In the first 10 months of 2006, 15 000 cases of chickenpox were reported in Scotland.

Over the same period in 2007, 19 500 cases of the disease were reported.

7A What was the percentage rise in the number of cases of chickenpox reported in Scotland from 2006 to 2007?

1 3.0

2 4.5

3 23.1

4 30.0

7B Doctors suggested that the actual number of cases during the whole of 2007 would be over 24 000.

This suggestion is . . .

1 hearsay.

2 a conclusion.

3 a hypothesis.

4 a prediction.

Read the extract from the article.

> Most children with chickenpox suffer only a few uncomfortable days. Yet we are being told that it is a serious disease against which we need to vaccinate. These recommendations are based on research which included all children admitted to hospitals in the UK and Ireland over a 13-month period. The researchers found that, out of a total population of over 10 million children, 112 children had serious complications with chickenpox. Six deaths were reported, but four of these children also had other chronic health problems.

7C The author of the article is against vaccination against chickenpox because . . .

1 it may further increase the number of cases of autism caused by vaccination.

2 chickenpox causes death in only a very small number of cases.

3 children with chickenpox do not get complications.

4 children already have too many painful vaccinations.

4.3.1.7 Vaccination

7D The author also claims that: 'Vaccination will push the disease into older age groups. These groups will catch the illness as their vaccine-induced immunity wears off. We have seen this happen with mumps.'

'Vaccine-induced immunity' will wear off because . . .

1 the number of white blood cells increases with age.

2 older people are less sensitive to antibiotics.

3 the number of antibodies in the blood gradually decreases with age.

4 older people do not produce antitoxins.

Turn over for the next question

4.3.1.7 Vaccination

Question 13

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.

4.3.1.7 Vaccination

Question 13 · continued

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

4.3.1.7 Vaccination

Question 14

June 2009 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

Vaccination helps to protect us from disease.

Vaccination may cause a reaction, such as a rash, in the person who is vaccinated.

The table shows the reported number of reactions to vaccination in the UK in one year.

Vaccine	Type of vaccination	Total number of reactions reported	Number of severe reactions
Measles	Single	414	61
Mumps	Single	54	19
Rubella	Single	685	100
MMR	Triple	20 974	2586

4A Which vaccine caused the highest proportion of severe reactions, when compared with the number of reactions reported?

1 measles

2 mumps

3 rubella

4 MMR

4B To calculate the percentage of people who had reactions to the vaccines, you would also need to know . . .

1 the number of vaccinations of each type given.

2 the age of each person vaccinated.

3 whether those people given one of the single vaccinations had previously been given one of the other single vaccinations.

4 the total population of the UK.

4.3.1.7 Vaccination

Question 14 · continued

The table shows the percentage of children vaccinated against some diseases in the UK.

Year	Percentage of children vaccinated			
	Polio	Whooping cough	Flu	Measles, mumps, rubella (MMR)
1996–1997	96	94	95	92
1997–1998	96	94	95	91
1998–1999	95	94	95	88
1999–2000	95	94	94	88
2000–2001	94	94	94	87
2001–2002	94	93	93	84
2002–2003	93	93	93	82
2003–2004	94	93	93	80
2004–2005	93	93	93	81
2005–2006	94	94	94	84

4C For which disease was the percentage of children vaccinated most stable between 1996 and 2006?

1 polio

2 whooping cough

3 flu

4 measles, mumps and rubella

4D It is important that the percentage of people in the population who have been vaccinated is high.

This is because . . .

1 it reduces the chance of epidemics.

2 fewer people may suffer side effects from the vaccine.

3 there is less chance that resistant strains of pathogen will develop.

4 antibodies will be produced quickly if the live pathogen is caught.

4.3.1.7 Vaccination

Question 15

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** . . . .

4.3.1.7 Vaccination

Question 16

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.

4.3.1.7 Vaccination

Question 16 · 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.

4.3.1.7 Vaccination

Question 17

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.

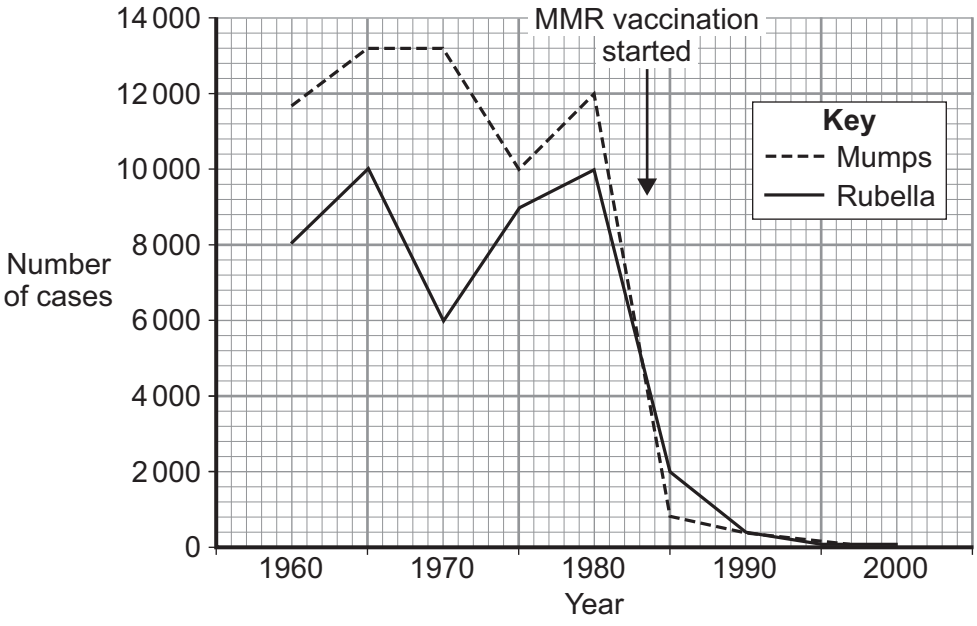
4.3.1.7 Vaccination

Question 18

June 2010 | BLY1AP | Original Q6 | Legacy

QUESTION SIX

The graph shows the effect of MMR vaccination on the number of cases of mumps and rubella in Finland.



6A By how many did the number of cases of rubella decrease between 1980 and 1990?

1 400

2 800

3 9 600

4 12 000

6B Rubella is caused by a virus. There were no cases of rubella in Finland after 1997.

What was the most probable reason for this?

1 There had been a large decrease in the number of cases of mumps by 1997.

2 An antibiotic cure for rubella was introduced in 1997.

3 The rubella pathogen mutated in 1997.

4 Most of the children in Finland had been vaccinated by 1997.

4.3.1.7 Vaccination

Question 18 · continued

Finland has a population of 4.4 million.

The table shows the occurrence of some side-effects linked to MMR vaccination in Finland by 1997.

Side-effect	Total number of side-effects linked to MMR vaccination by 1997	Number of side-effects per 100 000 people given MMR vaccine by 1997
Anaphylaxis	14	0.42
Asthma	5	0.15
Autism	0	0
Epilepsy	1	0.03
Febrile seizure	28	0.84
Urticaria	25	0.75

6C Using the data for anaphylaxis, how many people in Finland had been given the MMR vaccine by 1997?

1 588 000

2 1 385 000

3 3.3 million

4 4.4 million

6D Look at the data in the graph and the table.

What advice should a doctor in Finland give to a mother who is worried about her child being given the MMR vaccine?

1 There is no danger from being given the vaccine.

2 There is a slight risk of autism.

3 The risk of any side-effect is very low.

4 There is no need to have your child vaccinated with the MMR vaccine.

4.3.1.7 Vaccination

Question 19

November 2010 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

A virus causes influenza (flu).

Older people are much more likely to die from flu than younger people. The government offers flu vaccination to people aged over 65.

4A Flu vaccine contains . . .

1 antibodies.

2 antitoxins.

3 weakened virus.

4 white blood cells.

4B After the vaccination, people are immune to flu because their bodies . . .

1 destroy the flu virus in the vaccine.

2 produce antibodies against the flu virus.

3 produce antibiotics against the flu virus.

4 produce white blood cells to ingest the flu virus.

4C Every year, scientists develop a vaccine for several strains of the flu virus. They choose the strains that they think are most likely to be around in winter. Some older people get vaccinated but later die from flu.

The most likely reason for these deaths among older people is that . . .

1 they had not taken antibiotics.

2 they had suffered with flu last winter.

3 they were allergic to the vaccine.

4 there are many different strains of flu virus.

4.3.1.7 Vaccination

Question 19 · continued

4D People in a doctor's surgery made the comments below.

Which of these comments would be a valid reason for someone not to have the flu vaccination?

1 'I don't like injections.'

2 'I have a bad reaction to vaccines.'

3 'I never get flu anyway.'

4 'I've heard that my children might get flu from me if I have the vaccination.'

Turn over for the next question

4.3.1.7 Vaccination

Question 20

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.

4.3.1.7 Vaccination

Question 20 · 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

4.3.1.7 Vaccination

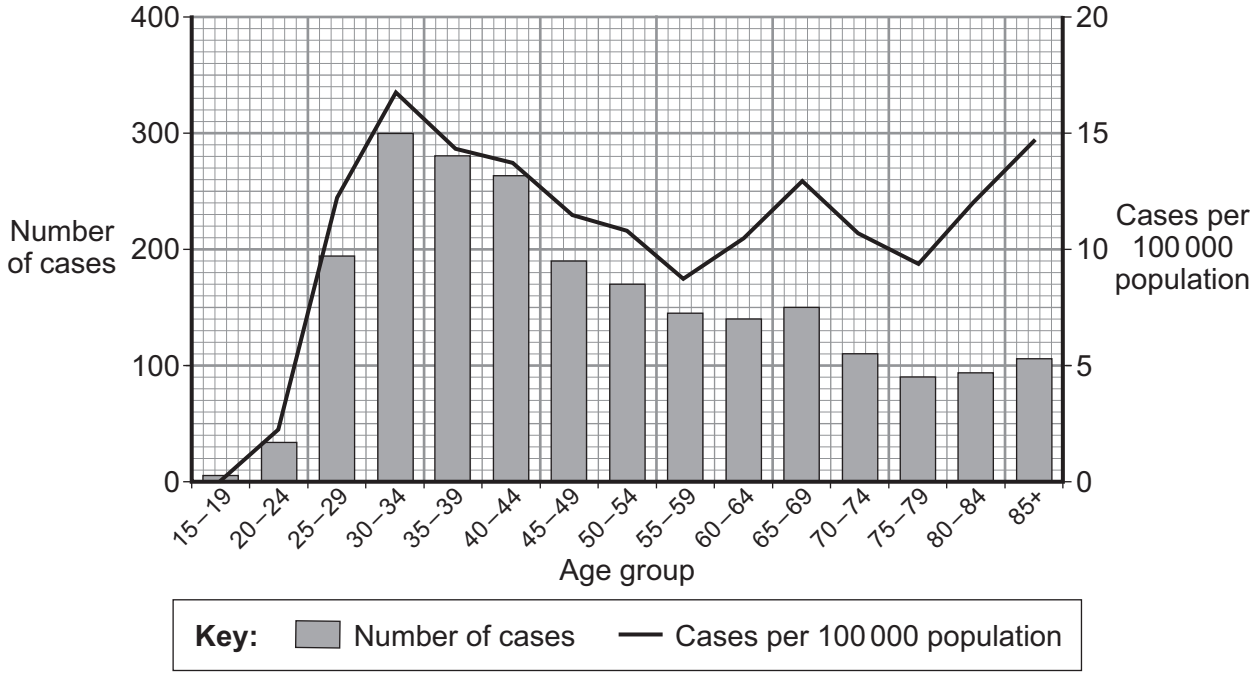
Question 21

June 2011 | BLY1AP | Original Q4 | Legacy

QUESTION FOUR

A virus causes cervical cancer. Sexual intercourse transmits the virus.

The graph shows the number of cases of cervical cancer diagnosed in England in 2005.



4A Which age group had the highest number of cases of cervical cancer?

1 15–19

2 30–34

3 40–44

4 85+

4B A city has 500 000 inhabitants.

How many women aged 65–69 would have been diagnosed with cervical cancer in 2005?

1 13

2 65

3 150

4 260

4.3.1.7 Vaccination

Question 21 · continued

4C The government has started a programme of vaccination against the cervical cancer virus. The programme starts with the vaccination of 14-year-old girls.

From the information in the graph, what is the reason for starting with this age group?

The girls in this age group . . .

1 are used to being vaccinated.

2 get booster doses of other vaccines at school.

3 have mainly not yet started their menstrual cycles.

4 have mainly not yet been infected with the virus.

4D Many parents do not agree with girls of 14 being vaccinated against the cervical cancer virus.

An ethical reason for this would be that the parents . . .

1 think vaccination might encourage the girl to have underage sex.

2 do not know how the vaccine works.

3 are afraid of side-effects.

4 cannot afford vaccination.

4.3.1.7 Vaccination

Question 22

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.

4.3.1.7 Vaccination

Question 22 · 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.

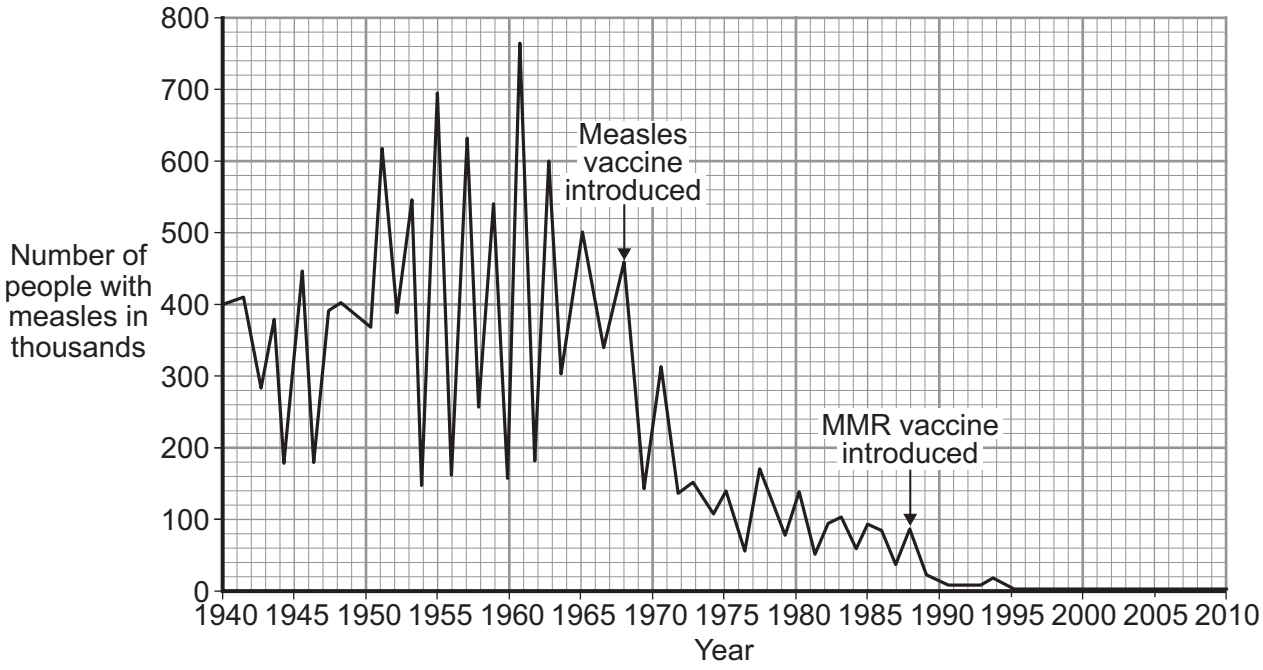
Turn over for the next question

4.3.1.7 Vaccination

Question 23

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)

4.3.1.7 Vaccination

Question 23 · 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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.....

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.....

.....

(3 marks)

8

4.3.1.7 Vaccination

Question 24

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?

.....

.....

.....

.....

(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)

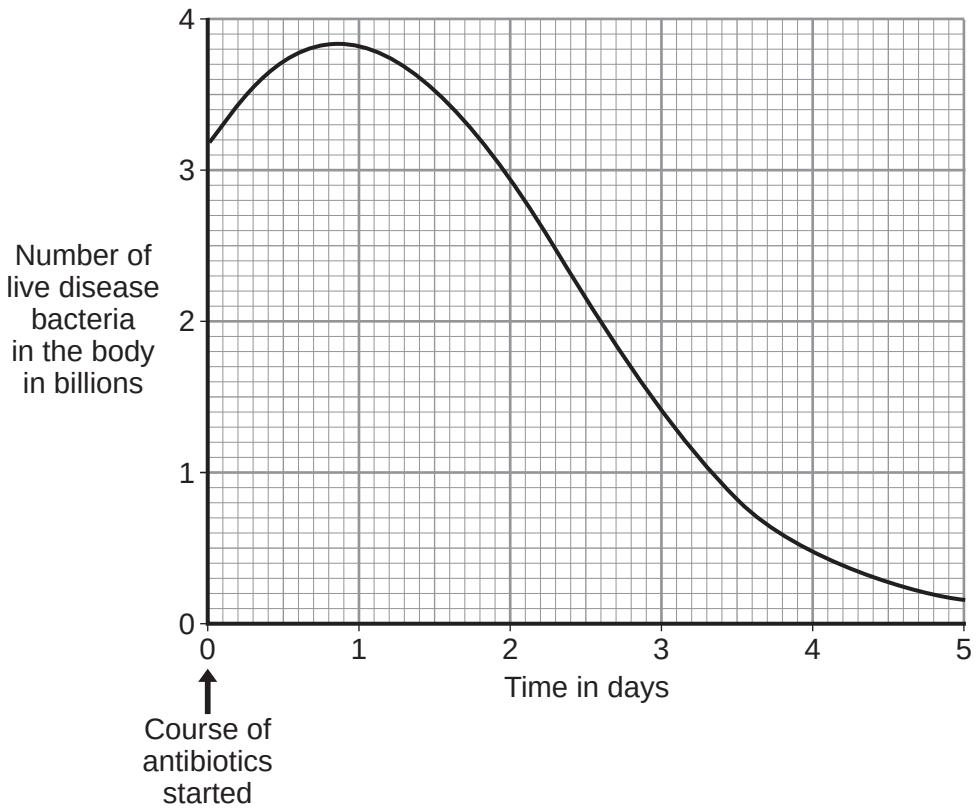
Question 5 continues on the next page

4.3.1.7 Vaccination

Question 24 · 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.



4.3.1.7 Vaccination

Question 24 · 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.

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(2 marks)

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

The new strain may spread rapidly.

Explain why.

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(3 marks)

10

4.3.1.7 Vaccination

Question 25

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?

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.....

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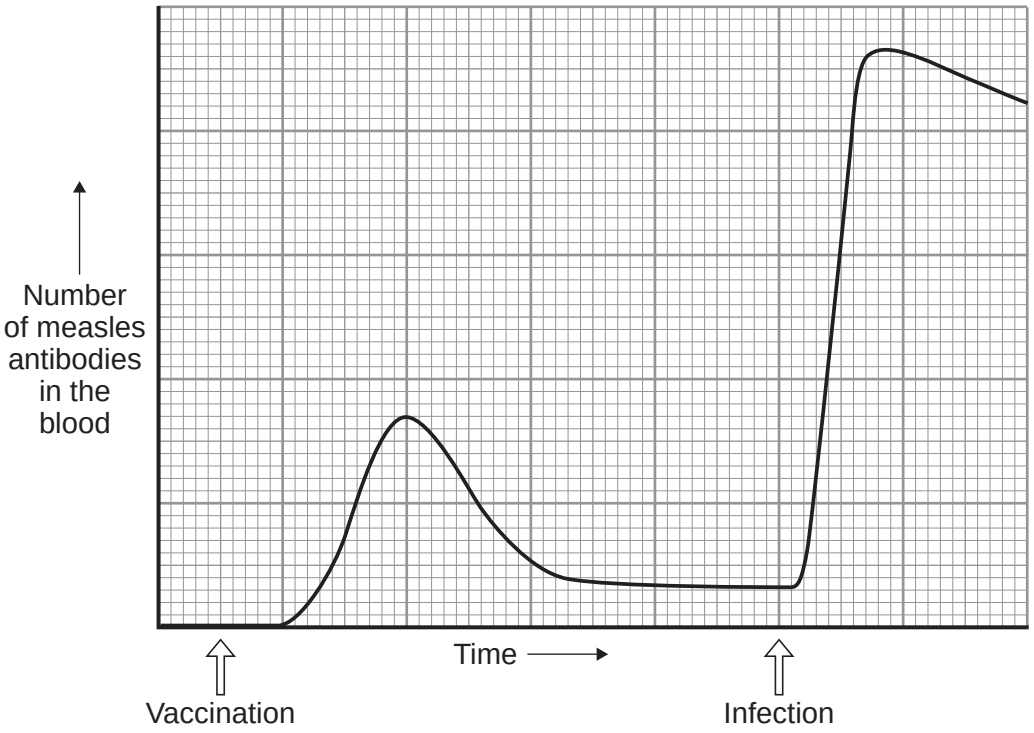
(2 marks)

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.

4.3.1.7 Vaccination

Question 25 · 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.

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(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

4.3.1.7 Vaccination

Question 26

June 2014 | BL1HP | Original Q4 | Legacy

4 The MMR vaccine is used to protect against measles.

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

[1 mark]

..... and .....

4 (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.

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

[2 marks]

.....

.....

.....

Percentage = ...

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

[1 mark]

.....

4.3.1.7 Vaccination

Question 26 · continued

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

[1 mark]

.....

.....

4 (c) (ii) Explain how a vaccination prevents infection.

[3 marks]

.....

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.....

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

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

[2 marks]

.....

.....

.....

.....

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

[1 mark]

.....

.....

11

4.3.1.7 Vaccination

Question 27

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]

4.3.1.7 Vaccination

Question 27 · 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

4.3.1.7 Vaccination

Question 28

June 2018 | 8461/1H | Original Q1

0 1 Eating food containing *Salmonella* bacteria can cause illness.

0 1 . 1 Two symptoms of infection by *Salmonella* are vomiting and diarrhoea.

What causes these symptoms?

[1 mark]

0 1 . 2 Give **two** ways a person with a mild infection of *Salmonella* can help prevent the spread of the bacteria to other people.

[2 marks]

1

2

0 1 . 3 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 mark]

0 1 . 4 A person with AIDS may take longer than a healthy person to recover from a *Salmonella* infection.

Explain why.

[2 marks]

4.3.1.7 Vaccination

Question 28 · continued

0 1 . 5 *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 mark]

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

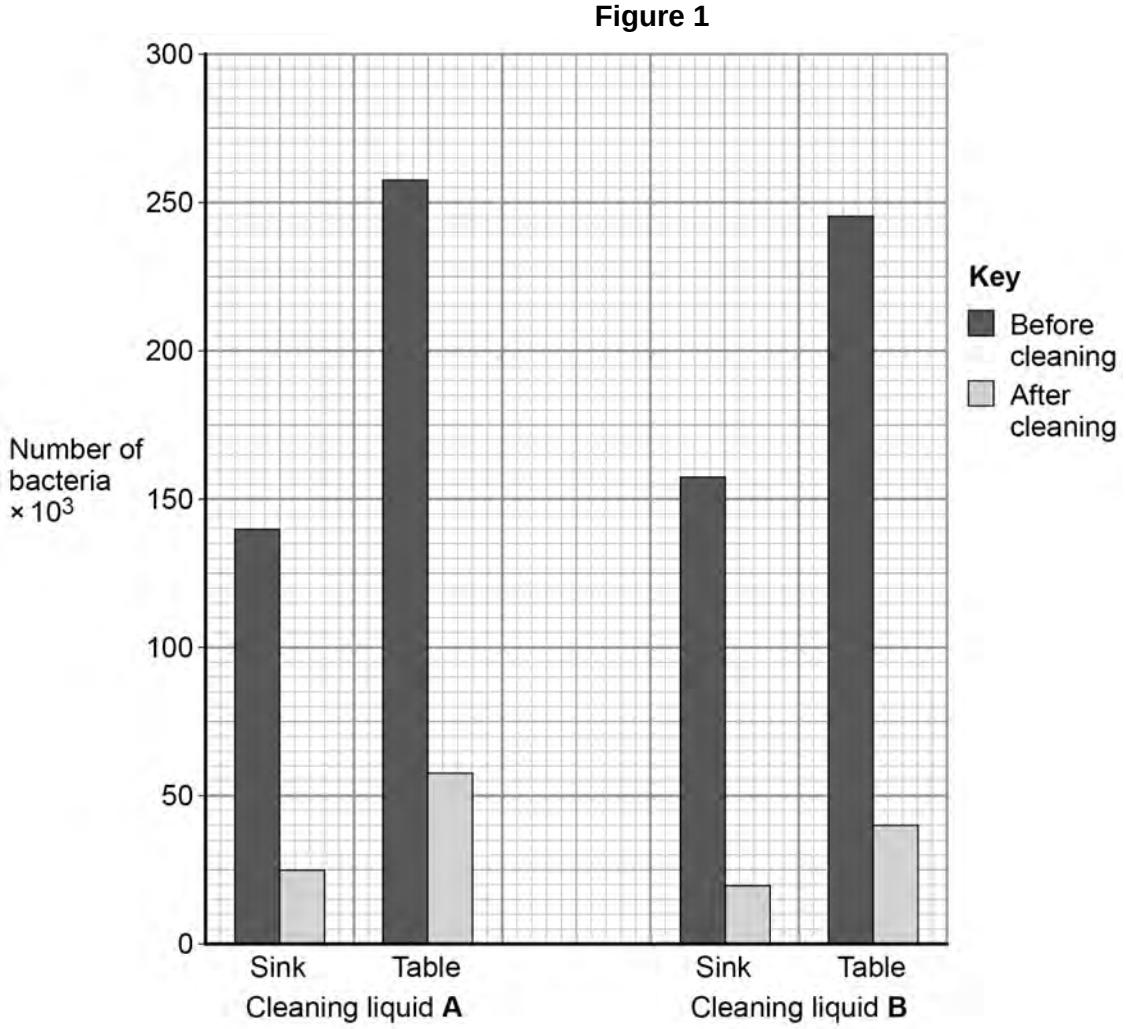
The scientist took samples from two work surfaces:

- 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



4.3.1.7 Vaccination

Question 28 · continued

0 1 . 6 Which cleaning liquid is the more effective?

Give a reason for your answer.

[1 mark]

Cleaning Liquid _____

Reason _____

_____

_____

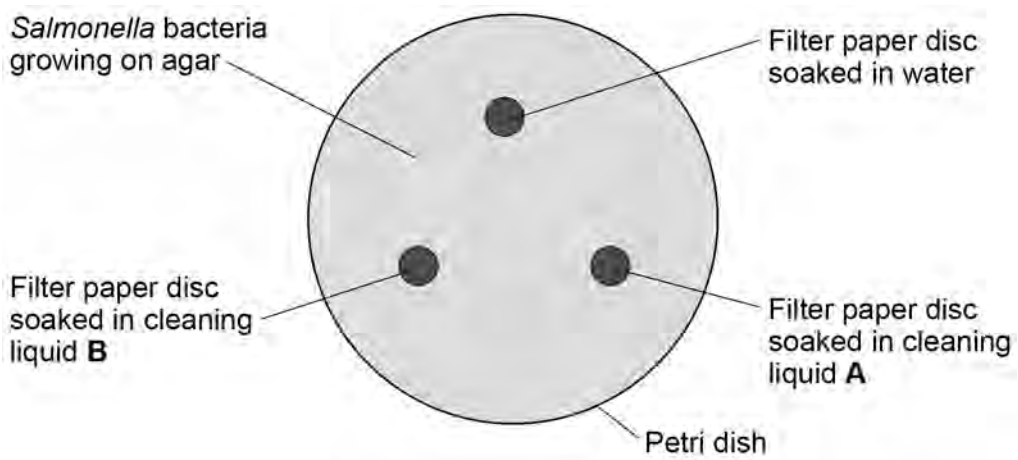
Question 1 continues on the next page

Question 28 · continued

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 **Table 1**.

Table 1

Filter paper disc	Area around disc with no bacteria growing in cm^2
Water	0
Cleaning liquid **A**	11
Cleaning liquid **B**	13

0 1 . 7 What measurement would the scientist need to take to calculate the area where no bacteria were growing?

[1 mark]

4.3.1.7 Vaccination

Question 28 · continued

0 1 . 8 Give **one** change to the investigation that would allow the scientist to check if the results are repeatable.

[1 mark]

0 1 . 9 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 mark]

11

4.3.1.7 Vaccination

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]

4.3.1.7 Vaccination

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

4.3.1.7 Vaccination

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.

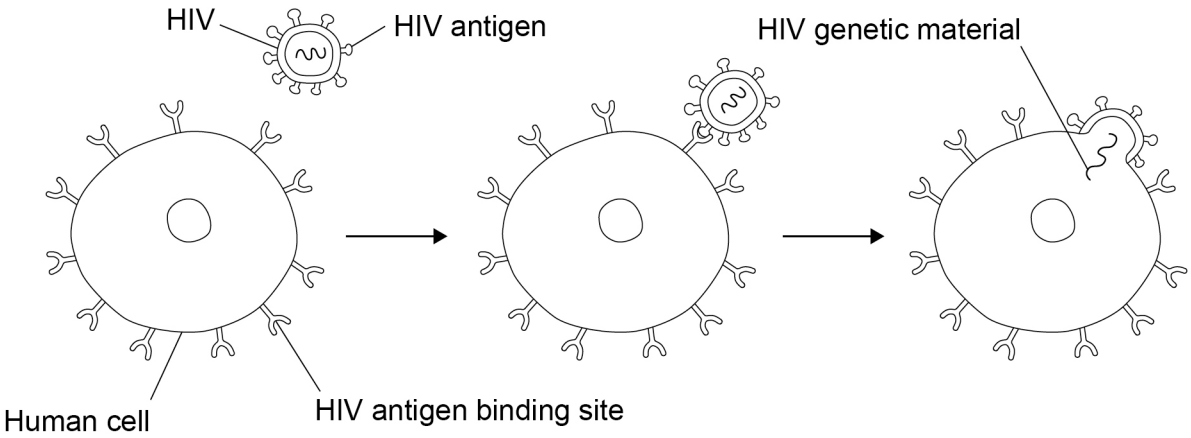
[4 marks]

4.3.1.7 Vaccination

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

4.3.1.7 Vaccination

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

4.3.1.7 Vaccination

Question 30 · continued

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

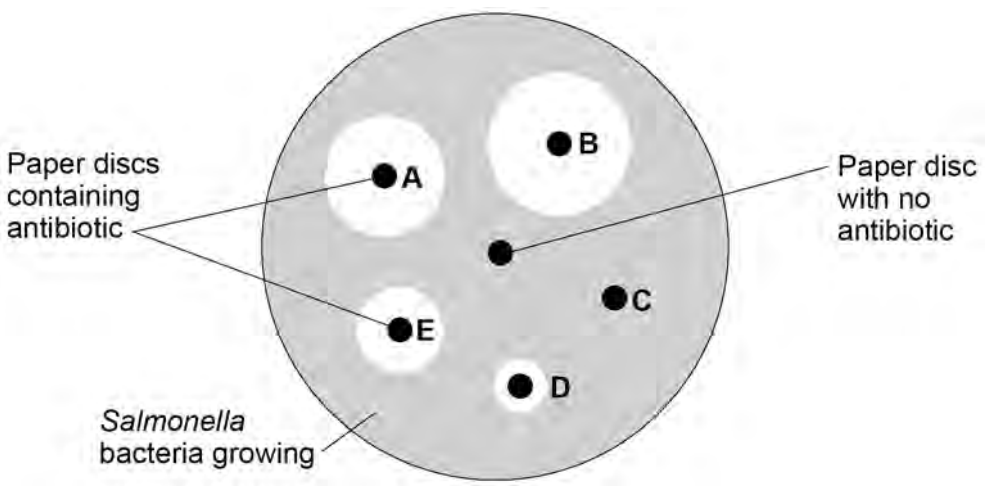
However, some patients may need to take antibiotics to recover.

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 _____

_____

4.3.1.7 Vaccination

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]

4.3.1.7 Vaccination

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

4.3.1.7 Vaccination

Question 31

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]

4.3.1.7 Vaccination

Question 31 · 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]

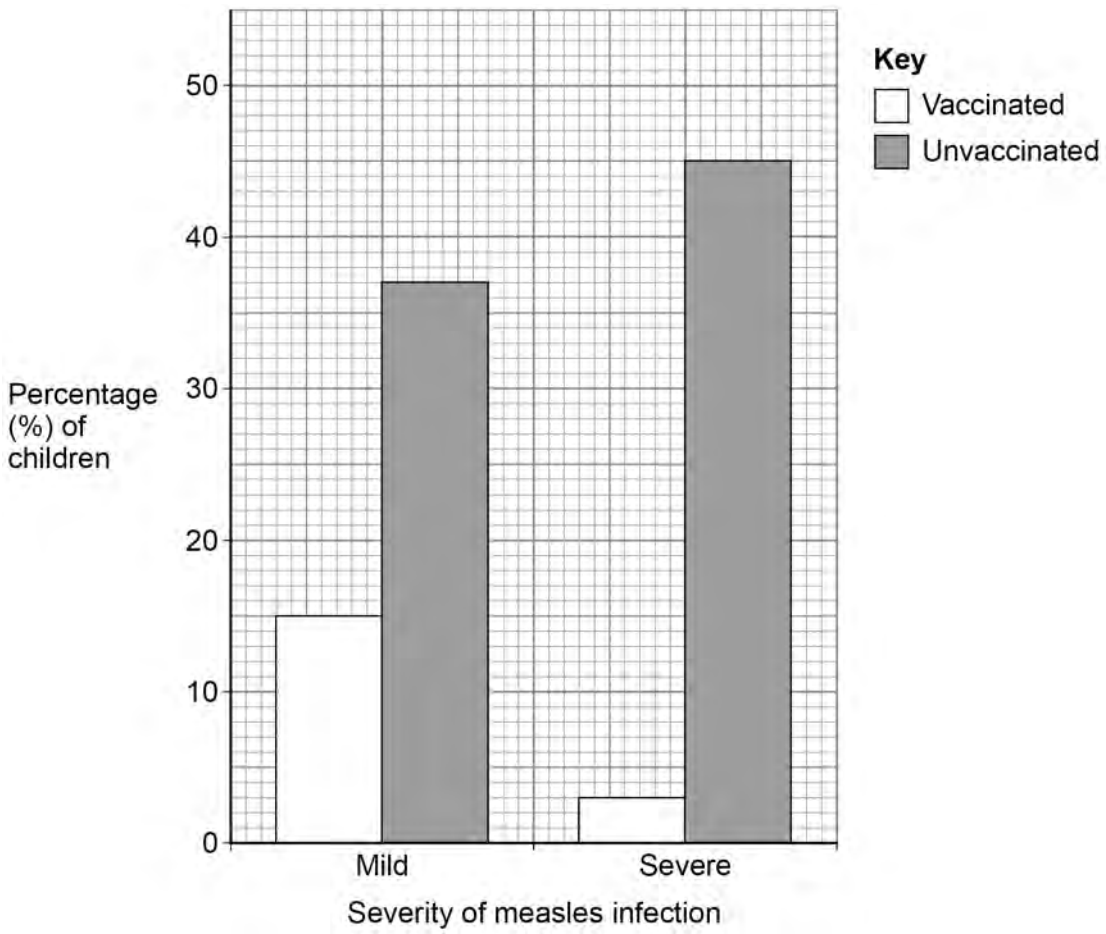
Question 1 continues on the next page

4.3.1.7 Vaccination

Question 31 · 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 = _____

4.3.1.7 Vaccination

Question 31 · 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