AQA GCSE Biology | 8461

SPECIFICATION POINT 4.3.1.2

Viral diseases

Past-paper questions

Tier	**Higher**
Question groups	**19**
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.

4.3.1.2 Viral diseases

Question 01

March 2007 | BLY1A | Original Q1 | Legacy

QUESTION ONE

Avian influenza (bird flu) is caused by a virus which was first identified in 1900. Recently there have been concerns that new strains of the virus may be able to infect humans.

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

A antibiotics

B natural selection

C pandemic

D resistance

Avian influenza cannot be treated with . . . **1** . . . .

The influenza virus may develop . . . **2** . . . to the drugs used as a result of . . . **3** . . . .

This may cause a . . . **4** . . . of the disease.

4.3.1.2 Viral diseases

Question 02

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.

4.3.1.2 Viral diseases

Question 02 · 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.

.....

.....

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.....

(2 marks)

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

Give the reason for your answer.

.....

.....

.....

(1 mark)

6

4.3.1.2 Viral diseases

Question 03

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.

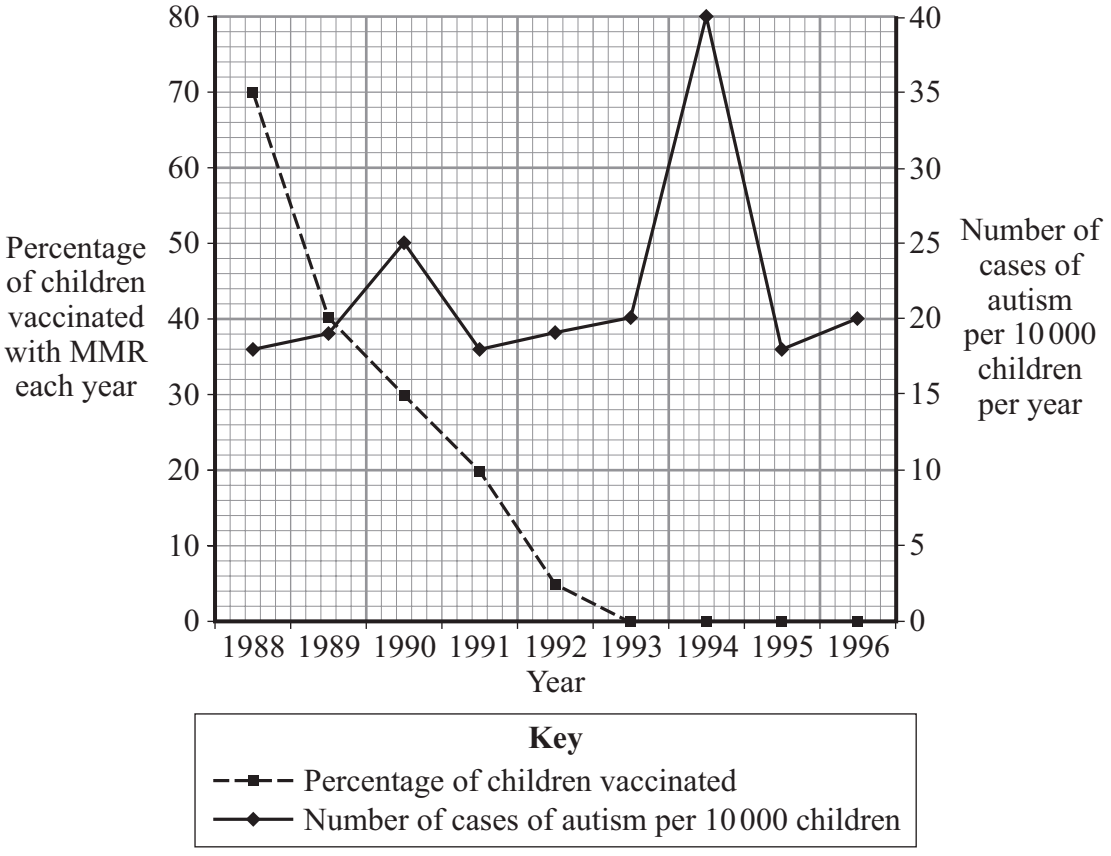
4 white blood cells will surround the virus.

4.3.1.2 Viral diseases

Question 03 · continued

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

4.3.1.2 Viral diseases

Question 04

January 2009 | BLY1H | Original Q2 | Legacy

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

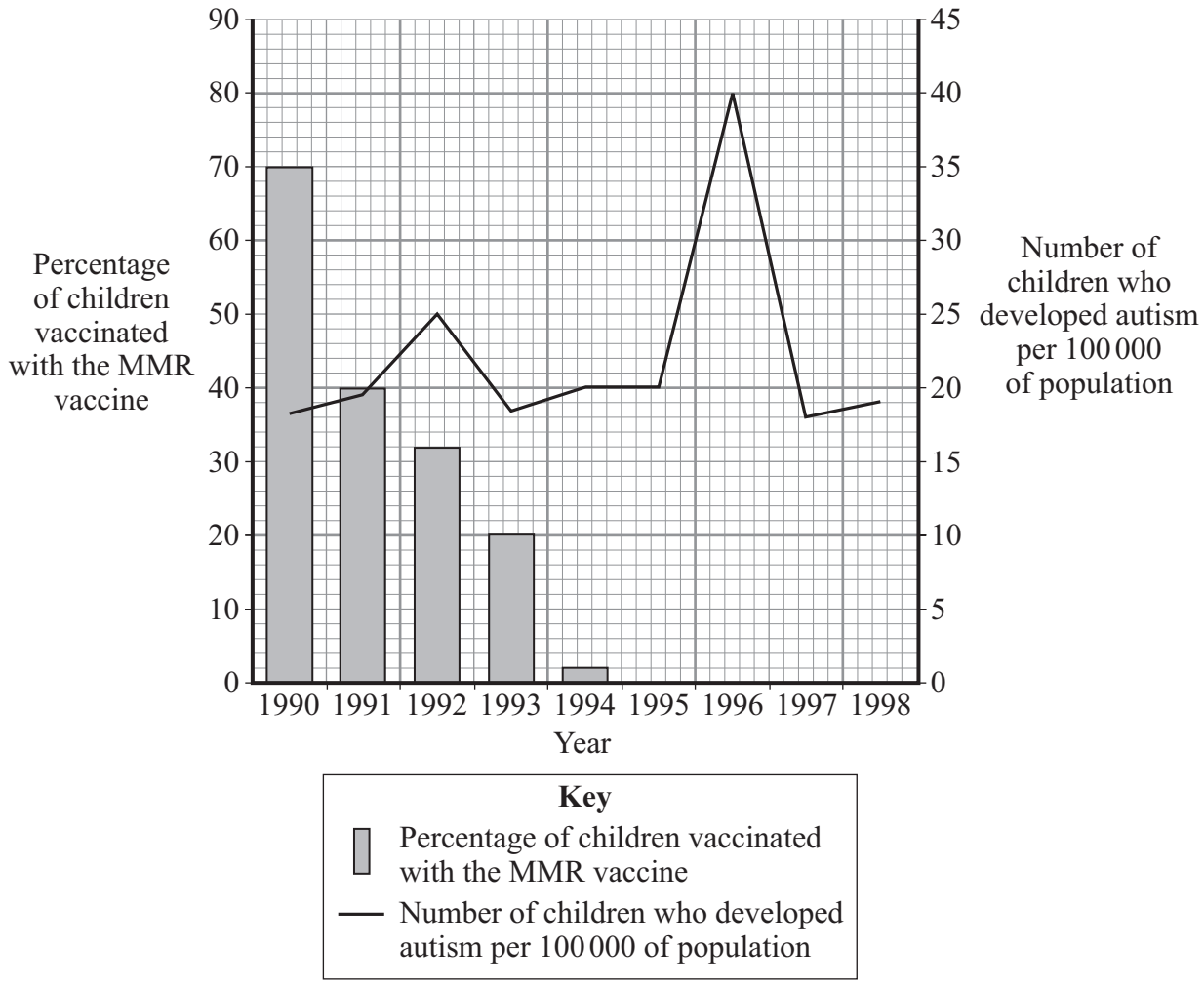
2 (a) Complete the sentences about vaccination.

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.



4.3.1.2 Viral diseases

Question 04 · 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

4.3.1.2 Viral diseases

Question 05

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.

4.3.1.2 Viral 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

4.3.1.2 Viral diseases

Question 06

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.

4.3.1.2 Viral diseases

Question 06 · 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.

4.3.1.2 Viral diseases

Question 07

June 2009 | BLY1H | Original Q4 | Legacy

4 Influenza is a disease caused by a virus.

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

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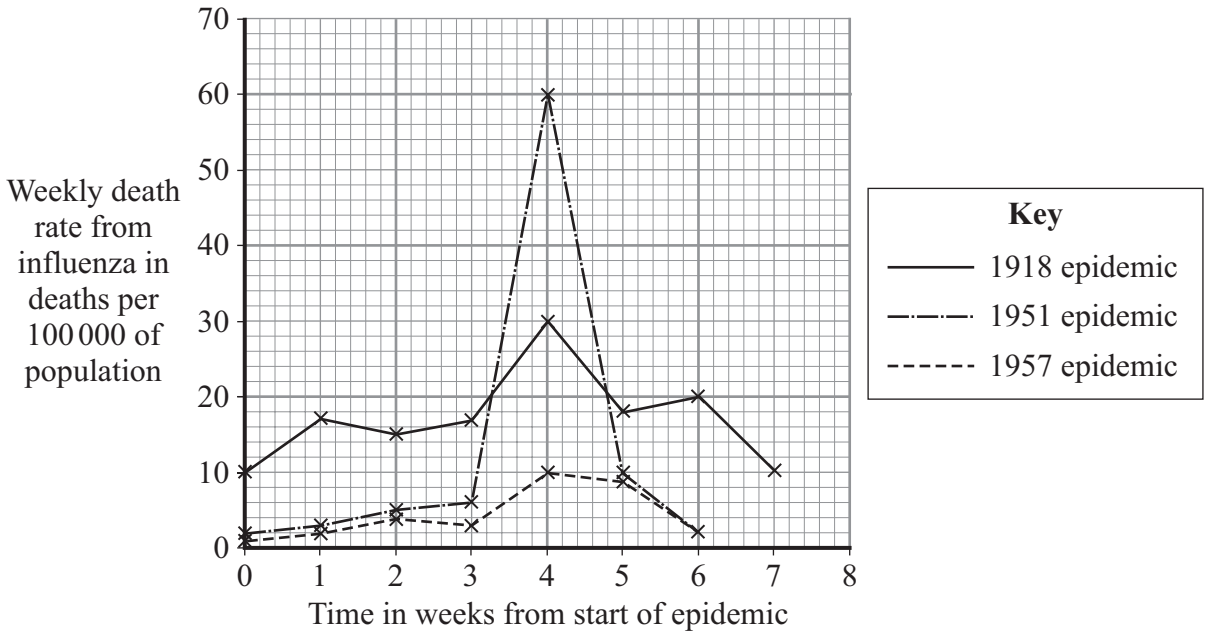
(2 marks)

4 (b) In some years there are influenza epidemics.

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



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

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

Show clearly how you work out your answer.

.....

.....

Number of deaths.....

(2 marks)

4.3.1.2 Viral diseases

Question 07 · continued

for mark

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

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

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(3 marks)

(Extra space) .....

7

4.3.1.2 Viral diseases

Question 08

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?

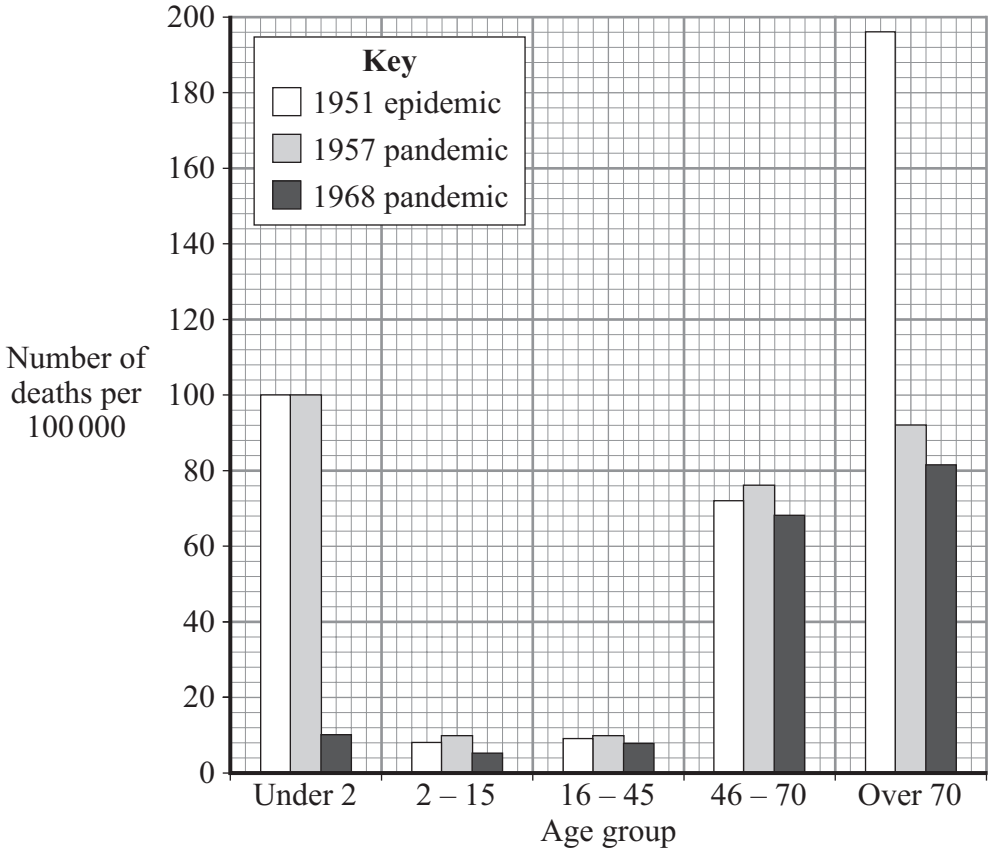
1 An epidemic results in more deaths.

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.



4.3.1.2 Viral diseases

Question 08 · 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.

4.3.1.2 Viral diseases

Question 09

January 2019 | BLY1H | Original Q6 | Legacy

6 Influenza is caused by a virus.

6 (a) How do viruses cause illness?

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.....

(1 mark)

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

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

Suggest an explanation for this.

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(3 marks)

4

4.3.1.2 Viral diseases

Question 10

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.

4.3.1.2 Viral diseases

Question 10 · 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.

4.3.1.2 Viral diseases

Question 11

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

4.3.1.2 Viral diseases

Question 12

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.

4.3.1.2 Viral diseases

Question 12 · 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

4.3.1.2 Viral diseases

Question 13

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.

4.3.1.2 Viral diseases

Question 13 · 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.

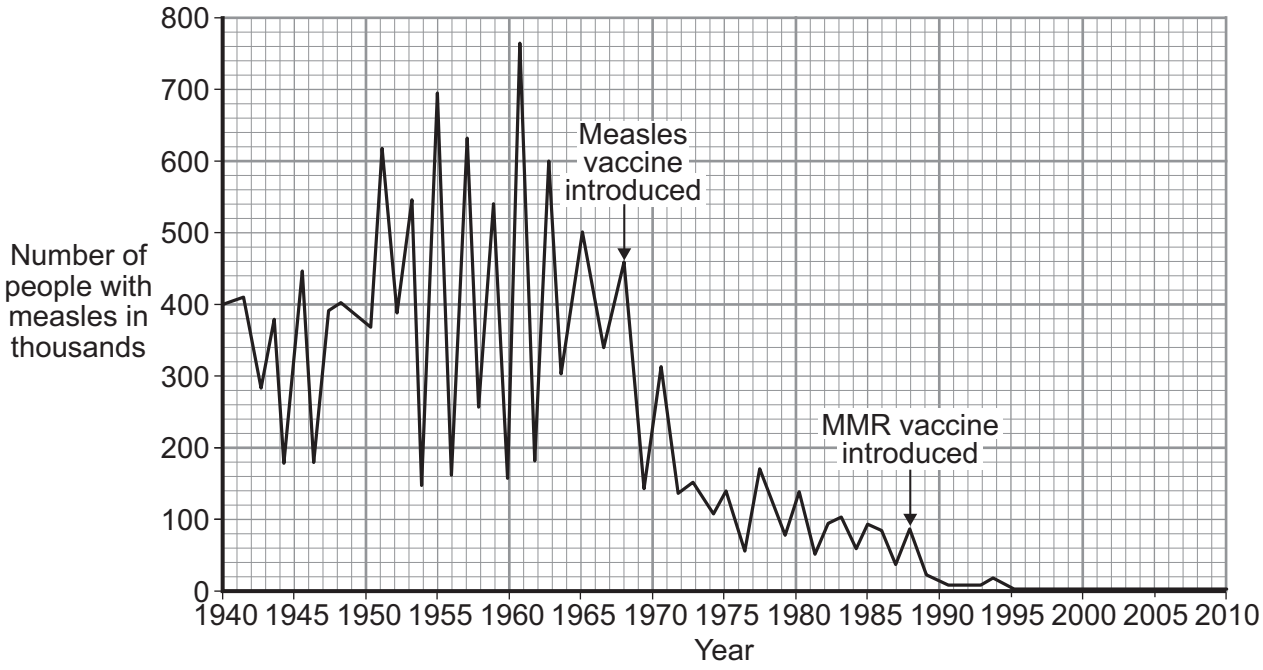
Turn over for the next question

4.3.1.2 Viral diseases

Question 14

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)

4.3.1.2 Viral diseases

Question 14 · 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

4.3.1.2 Viral diseases

Question 15

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)

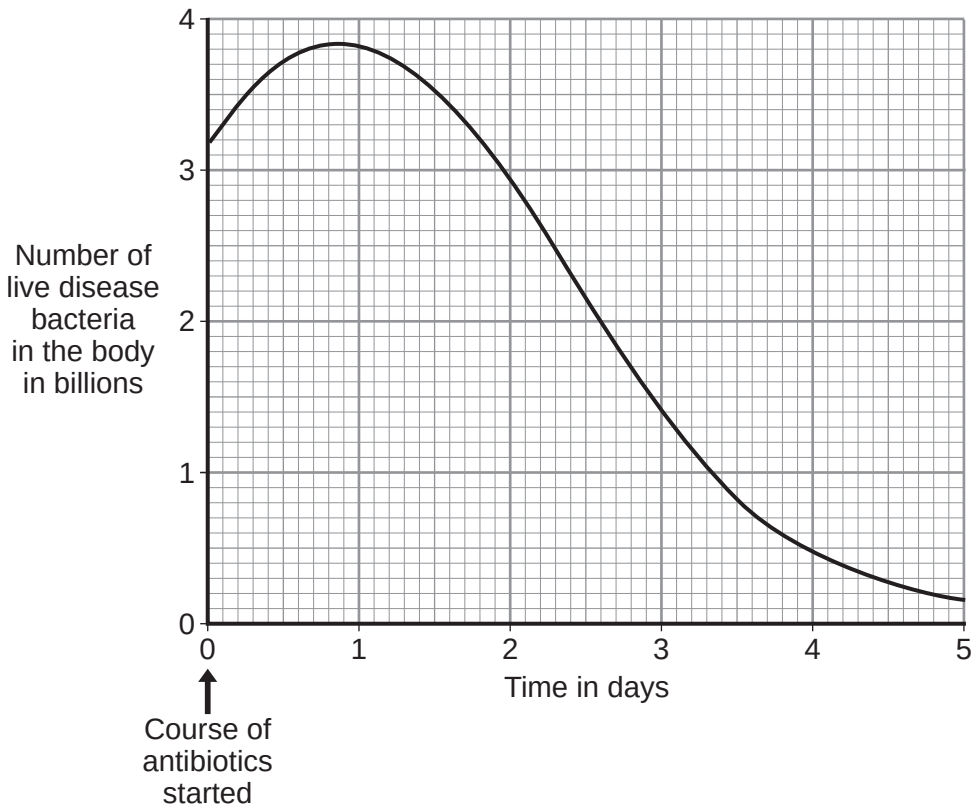
Question 5 continues on the next page

4.3.1.2 Viral diseases

Question 15 · 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.



4.3.1.2 Viral diseases

Question 15 · 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

4.3.1.2 Viral diseases

Question 16

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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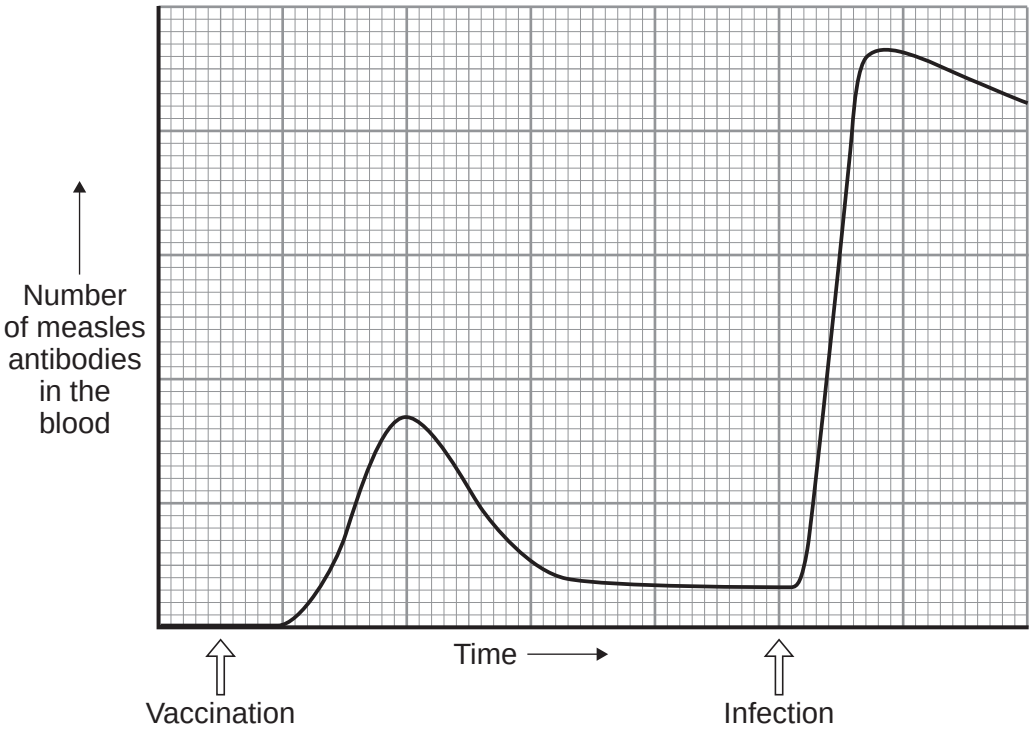
(2 marks)

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.

4.3.1.2 Viral diseases

Question 16 · 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?

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(1 mark)

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

.....

(1 mark)

10

4.3.1.2 Viral diseases

Question 17

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]

.....

4.3.1.2 Viral diseases

Question 17 · 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]

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

[1 mark]

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11

4.3.1.2 Viral diseases

Question 18

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]

4.3.1.2 Viral diseases

Question 18 · 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

4.3.1.2 Viral diseases

Question 18 · 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.

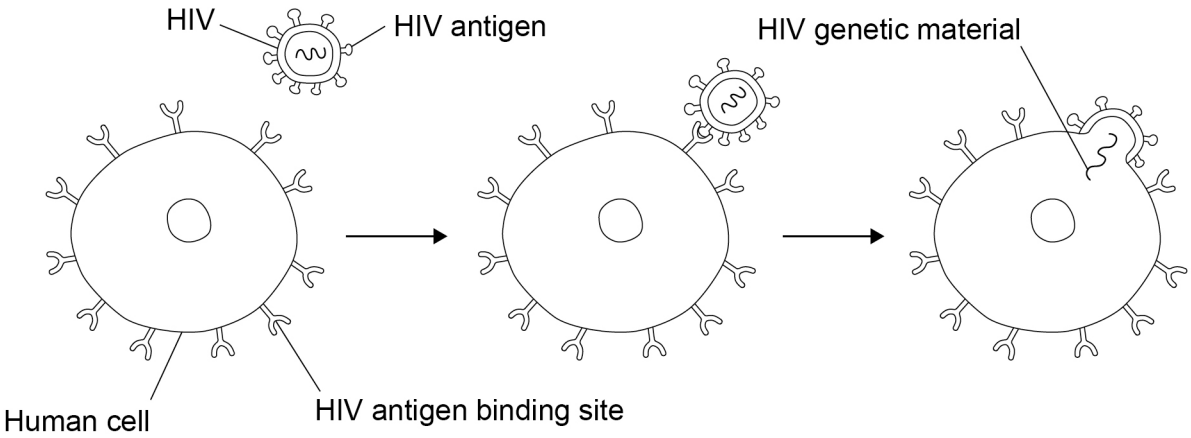
[4 marks]

4.3.1.2 Viral diseases

Question 18 · 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

4.3.1.2 Viral diseases

Question 19

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]

4.3.1.2 Viral diseases

Question 19 · 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]

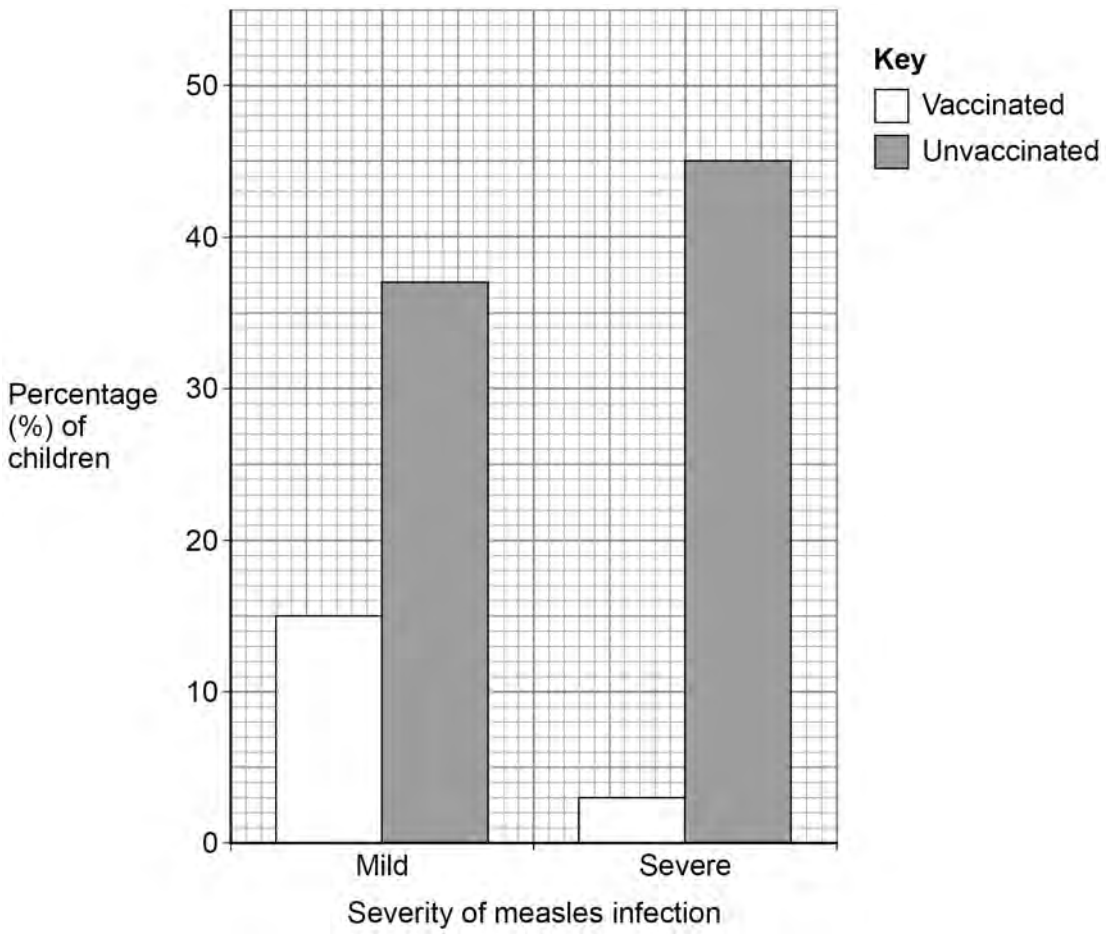
Question 1 continues on the next page

4.3.1.2 Viral diseases

Question 19 · 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 = _____

4.3.1.2 Viral diseases

Question 19 · 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