Infection and Response 5

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Name: _____

Class: _____

Date: _____

Time: **66 minutes**

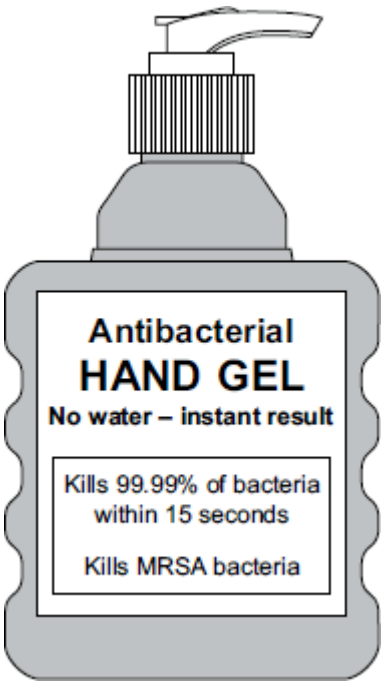
Marks: **66 marks**

Comments:

Q1.

MRSA strains of bacteria are causing problems in many hospitals.

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



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

Explain why.

_____

_____

_____

_____

(2)

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

_____

_____

_____

_____

_____

_____

(3)

(Total 5 marks)

Q2.

The body's immune system protects us from diseases.

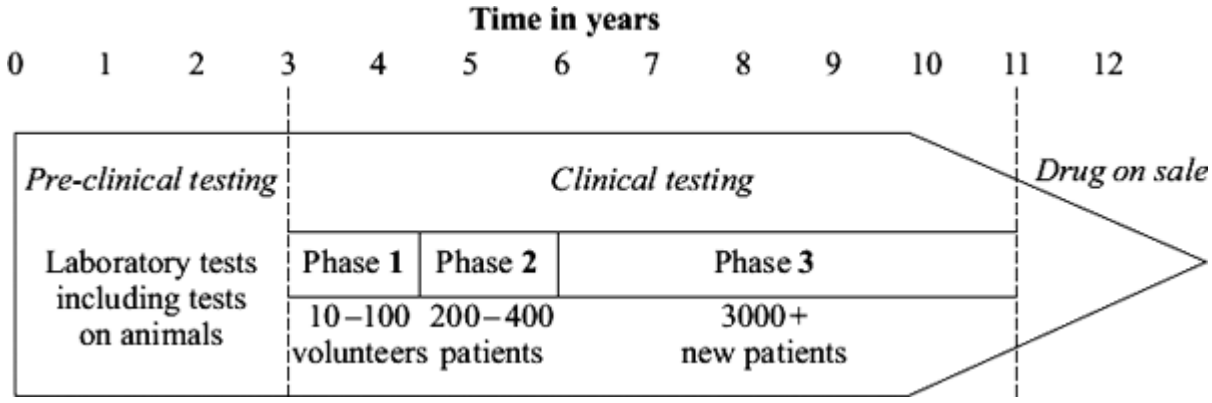
Describe the different ways in which white blood cells protect us from infectious diseases.

(Total 4 marks)

Q3.

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

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



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

(1)

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

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

(1)

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

Suggest **one** reason for this.

_____

_____

(1)

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

_____

_____

(1)

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

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

_____

_____

(1)

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

Tick (✓) **one** box.

Only the patients ☐

Only the doctors ☐

Both patients and doctors ☐

Neither patients nor doctors ☐

(1)

(Total 6 marks)

Q4.

Influenza is caused by a virus.

(a) How do viruses cause illness?

_____

_____

(1)

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

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

Suggest an explanation for this.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 4 marks)

Q5.

Diet and exercise affect health.

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

Obesity can lead to heart disease.

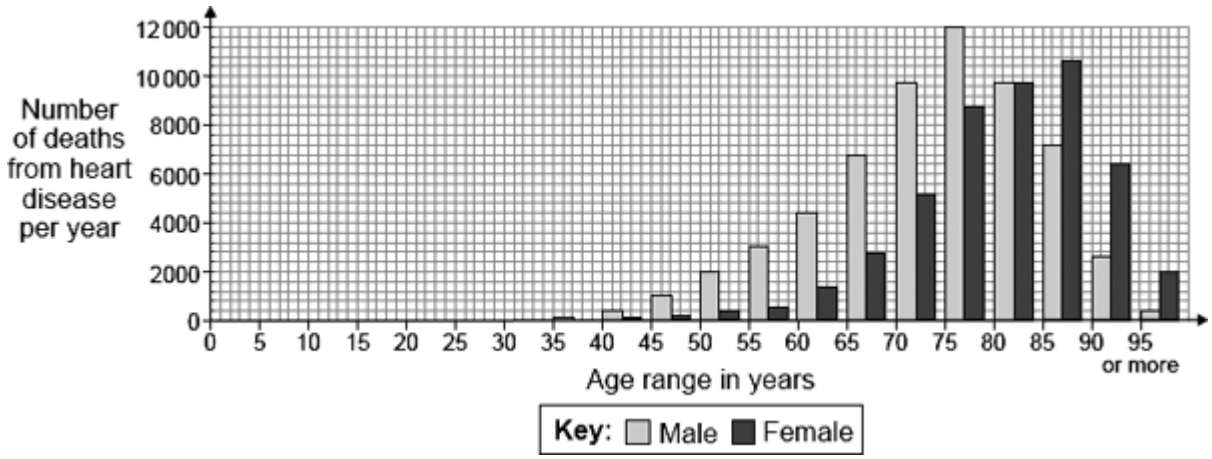
Other than heart disease, name **two** conditions which are linked to obesity.

1. _____

2. _____

(2)

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



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

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

1. _____

2. _____

(2)

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

1. _____

_____

2. _____

_____

(2)

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

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

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(Total 9 marks)

Q6.

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

(a) Complete the sentences about vaccination.

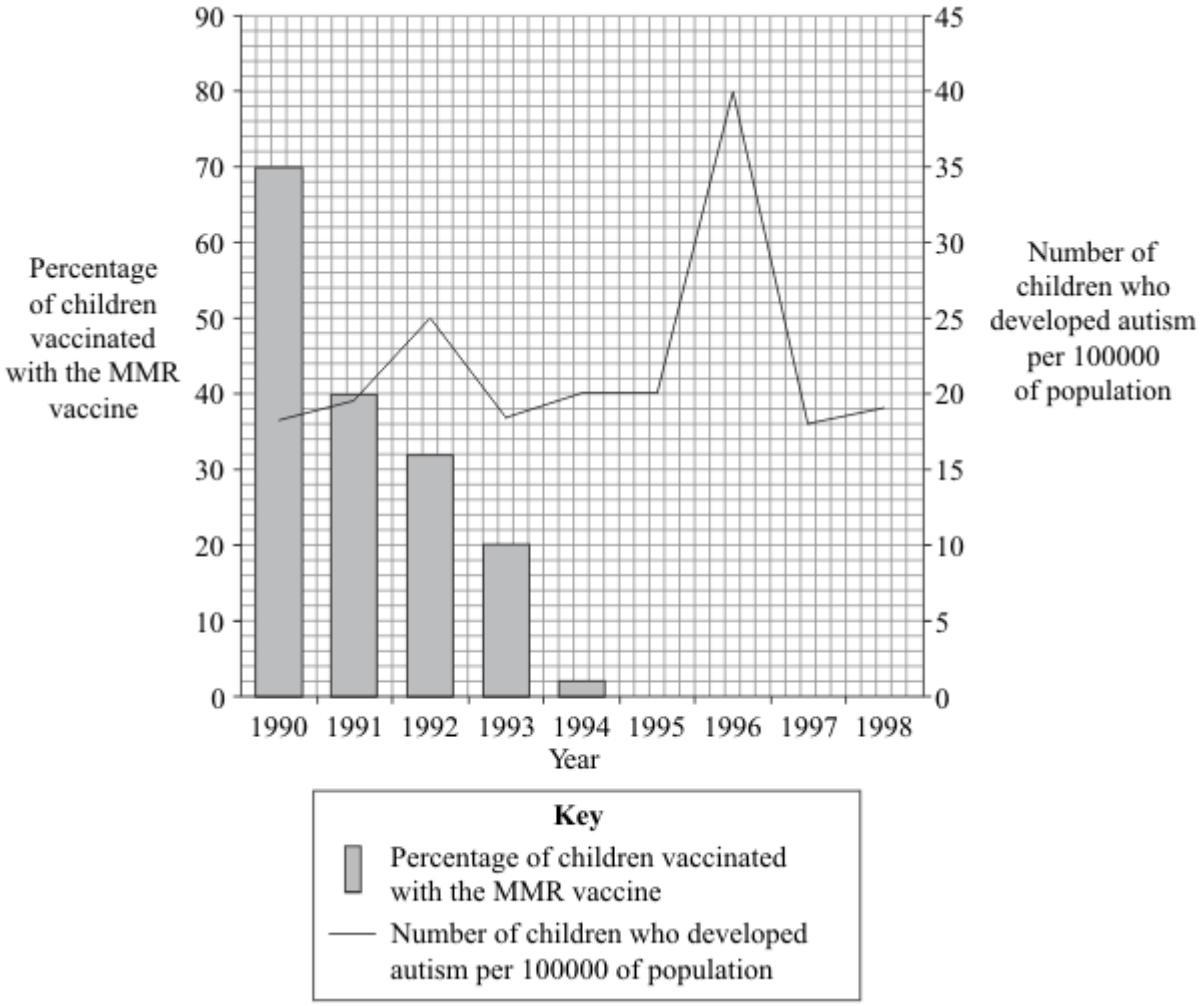
Vaccines stimulate white blood cells to produce _____ .

This makes children _____ to the pathogen.

(2)

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

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



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

_____

_____

_____

_____

_____

(2)

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

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

Explain the reason for your answer.

_____

_____

_____

_____

_____

(2)

(Total 6 marks)

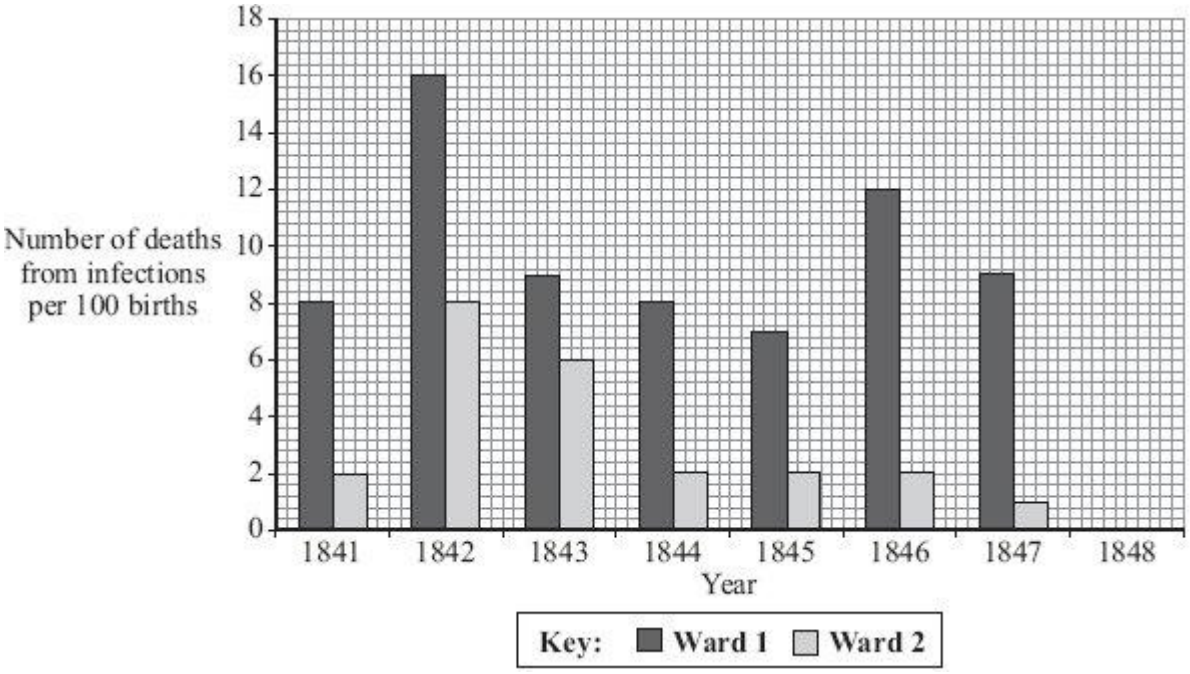
Q7.

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

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

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

The bar chart shows the results of his investigations.



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

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

Show clearly how you work out your answer.

_____

Number of mothers who died _____

(2)

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

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

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

_____

_____

(1)

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

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

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

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

(1)

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

_____

_____

(1)

(iii) Suggest an explanation for this effect.

_____

_____

(1)

(Total 6 marks)

Q8.

Influenza is a disease caused by a virus.

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

_____

_____

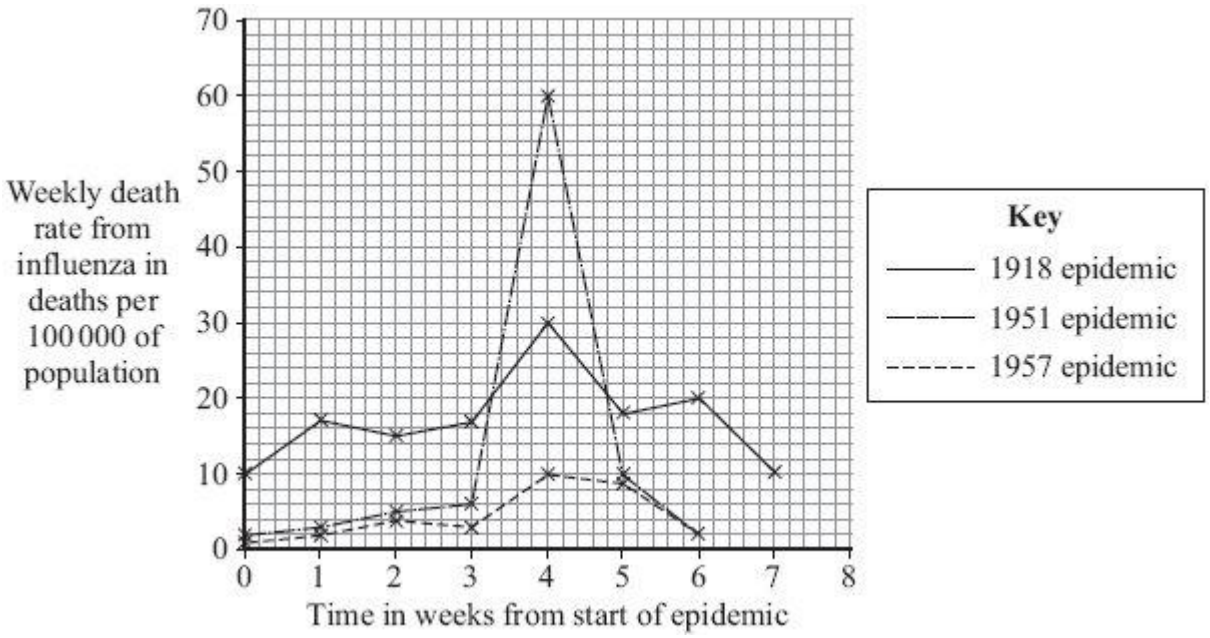
_____

_____

(2)

(b) In some years there are influenza epidemics.

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



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

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

Show clearly how you work out your answer.

_____

_____

Number of deaths _____

(2)

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

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

_____

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

Q9.

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

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

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

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

(1)

(ii) The vaccine contains an | active / infective / inactive | form of the polio virus.

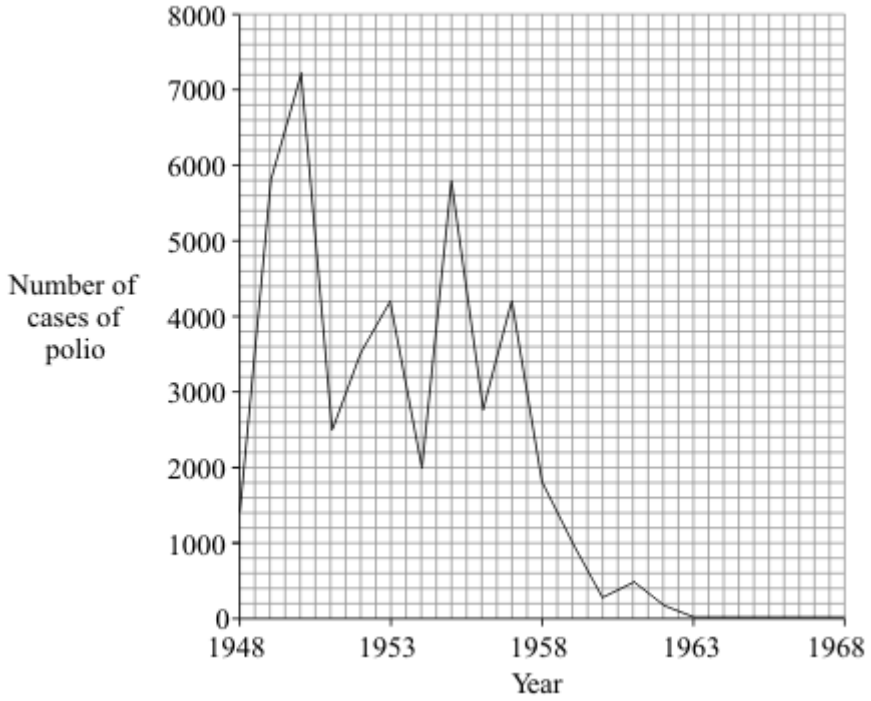
(1)

(iii) The vaccine stimulates the white blood cells to

produce | antibiotics / antibodies / drugs | which destroy the virus.

(1)

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



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

_____

(1)

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

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

_____

(1)

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

Suggest **one** reason for this.

_____

_____

(1)

(Total 6 marks)

Q10.

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

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

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Read the passage.

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

Use information from the passage above to answer these questions.

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

Explain the reasons for your answer.

_____

_____

_____

_____

(2)

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

Give the reason for your answer.

_____

_____

_____

(1)

(Total 6 marks)

Q11.

Pathogens can enter the body and cause disease.

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

_____

(1)

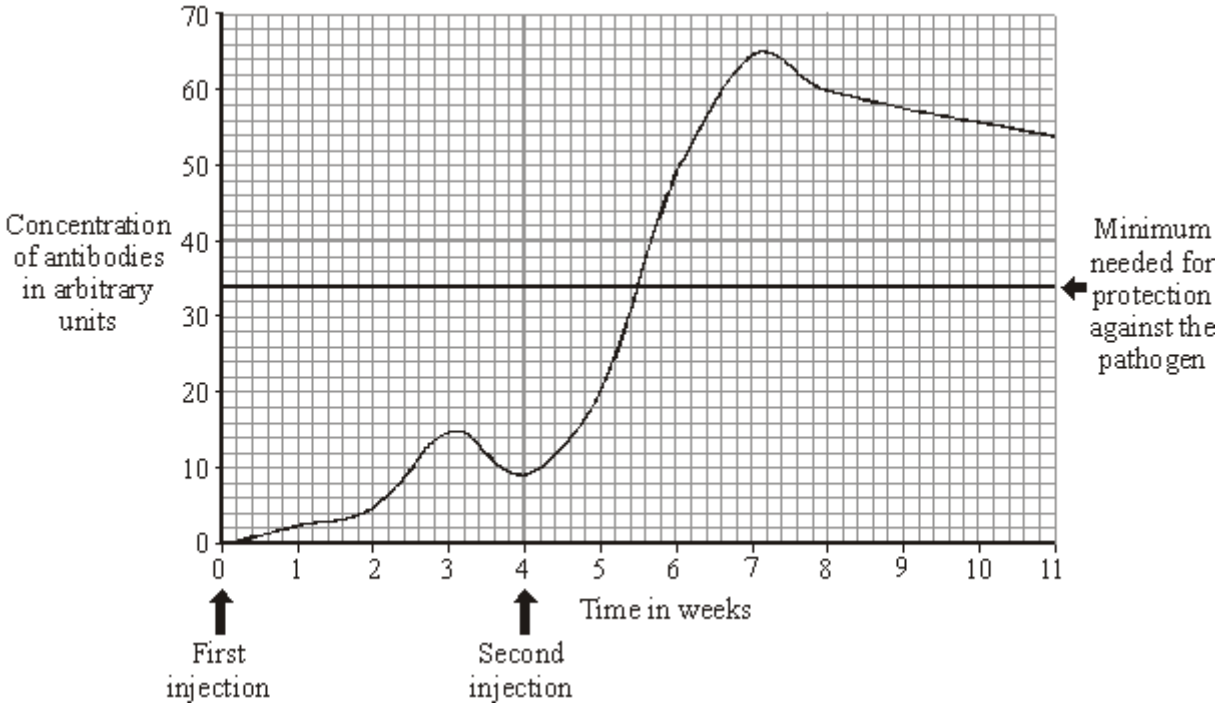
(ii) Name **one** type of medicine which helps to relieve the symptoms of infectious disease.

_____

(1)

(b) Vaccination protects us from pathogens.

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



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

_____ weeks

(1)

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

_____

_____

_____

_____

_____

(3)

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

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

Give a reason for your answer.

_____

(1)

(Total 7 marks)

Q1.

(a) kills / destroys bacteria / MRSA

*do **not** allow germs*

1

prevents / reduces transfer

allow stops MRSA entering ward

1

(b) mutation

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

1

(causes) resistance

allow not effective

ignore immunity

1

to antibiotics

1

[5]

Q2.

(wbc) ingest / digest pathogens / bacteria / viruses

allow eat germs

ignore swallow germs

ignore ingest the disease

ignore attack / kill the disease

1

(wbc) produce antibodies

1

(wbc) produce antitoxins

1

any **one** from:

- (antibodies) destroy or kill pathogens / bacteria / viruses / germs

  ignore destroy / kill disease

  ignore attack / fight pathogens

- (antitoxins) counteract / destroy / neutralise toxins / poisons

  ignore attack / killing toxins

- reasonable reference to memory cells **or** rapid production of antibodies upon re-infection

1

[4]

Q3.

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

ignore side effects unqualified

1

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

ignore to see if it works

*do **not** accept dosage*

1

(ii) any **one** from

ignore immune system

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

1

(c) to find optimum dose

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

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

1

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

allow control / fake / false

allow tablet / injection that does not affect body

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

1

(ii) neither patients nor doctors

1

[6]

Q4.

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

ignore invade cells

1

(b) any **three** from:

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

  ignore resistant

- TV crew had / produced antibodies / Indians had no antibodies **or** antibody production faster in TV crew
- TV crew had previous exposure to flu / had been vaccinated

or

Indian tribe had no previous exposure to flu / had not been vaccinated
allow immunised

- Indians caught disease from TV crew

or

TV crew were carriers (of the virus)

3

[4]

Q5.

(a) any **two** from:

- arthritis
  allow damaged joints
- diabetes
  accept high blood sugar
- high blood pressure
- strokes
  allow blocked blood vessels / thrombosis
- allow breathing difficulties
  ignore cancer
  ignore high cholesterol

2

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

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

2

(ii) any **two** from:

- men smoke more (cigarettes)
  ignore alcohol
- more men smoke
- men under more stress

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

2

(c) *points can be in any order*

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

1

tests for side effects on volunteers / healthy people / small numbers

1

widespread testing
or
testing for optimum dose
or
test on patients / sick people
or
test to see if it is effective
accept use of placebo

1

[9]

Q6.

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

1

immune
ignore protection
allow resistant

1

(b) (i) fell

1

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

1

(ii) (no)

ignore circle

1

% vaccination fell **or** when no vaccination

but autism numbers did not fall / stayed high / increased

or

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

6 year time lag quantified (1)

1

[6]

Q7.

(a) (i) 12

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

*if answer incorrect evidence of (number of deaths) × 6 **or** 2 seen gains **1** mark*

2

(ii) (ward 2)

more deaths / infections on ward 1

or

less deaths / infections on ward 2

1

(b) (i) **both** bars correctly plotted

*ie plots in spaces between 2.8 and 3.2 **and** 0.8 and 1.2*

ignore width and shading

1

(ii) less deaths / infections

1

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

accept less infections passed on

1

[6]

Q8.

(a) any **two** from

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

- viruses mutate **frequently**

2

(b) (i) 420

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

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

ignore 6 000 000

2

(ii) any **three** from:

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

ignore resistance

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

allow no tamiflu / anti-viral drugs

- conditions less hygienic / lack of hygiene
- people in poor health (following world wars)

allow people had 'weak' immune system

3

[7]

Q9.

(a) (i) lives inside cells

1

(ii) inactive

1

(iii) antibodies

1

(b) (i) 1950

1

(ii) 8 (years)

1

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

- disease could be reintroduced (from abroad)

disease might come back insufficient

- disease would spread if it came back

- protection on holiday abroad
- high proportion of immune people needed to prevent epidemic

1

[6]

Q10.

(a) any **three** from:

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

3

(b) (i) (no)

any **two** from

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

2

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

1

[6]

Q11.

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

1

(ii) painkillers
accept named painkillers eg aspirin

1

(b) (i) 5.5 / 5 ½ weeks

1

(ii) rose gains **1** mark

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

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

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

3

(iii) (no)

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

1

[7]