

Q1.

Chickenpox is a disease. Many children get chickenpox.

Most children recover quickly with no serious long term effects.

Chickenpox cannot be treated with antibiotics.

(a) What type of pathogen causes chickenpox?

(1)

People can pay for their child to be vaccinated against chickenpox.

The vaccination stimulates the production of antibodies.

(b) Which part of the blood produces antibodies?

Tick **one** box.

Plasma

Platelets

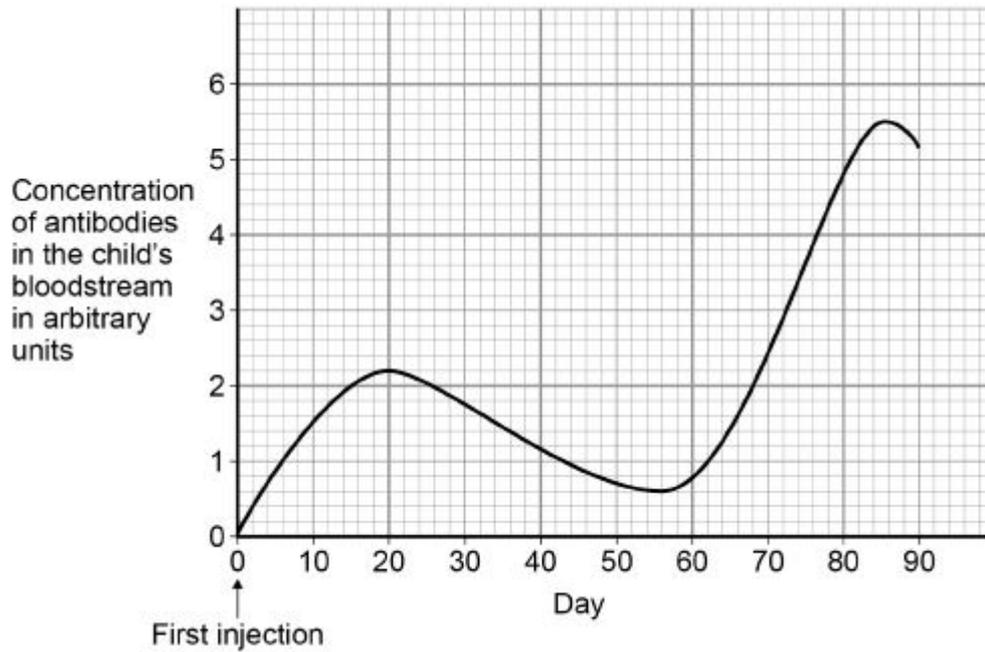
Red blood cells

White blood cells

(1)

The vaccination involves two injections.

The graph below shows how the concentration of antibodies in a child's bloodstream changes.



(c) Suggest on what day the second injection was given.

Day = _____

(1)

(d) On which day is the child's ability to defend against chickenpox at its peak?

Day = _____

(1)

Children can only have the chickenpox vaccination if their parents pay for the vaccine.

Some people think the vaccination should be free to all children.

(e) If more people were vaccinated the number of children getting chickenpox would decrease.

What are **two** possible reasons for this decrease?

Tick **two** boxes.

Drugs to treat chickenpox are no longer effective

Children are less likely to come into contact with someone with the disease

More people will have the correct antibodies

People may catch the disease from the vaccination

People may have a weakened immune system

(2)

- (f) The government needs to decide whether to make the chickenpox vaccination free to all children.

Suggest **two** factors the government should consider when making this decision.

1. _____

2. _____

(2)

(Total 8 marks)

Q2.

Some diseases are communicable.

- (a) What does communicable disease mean?

Tick **one** box.

A disease that can be spread from one person to another.

A disease that cannot be treated with antibiotics.

A disease that is not spread from animals to humans.

A disease that is passed on through genes.

(1)

- (b) A woman becomes ill and has the following symptoms:

- pain when urinating
- thick yellow discharge from vagina.

Which communicable disease does the woman have?

Tick **one** box.

Gonorrhoea

HIV

Measles

Salmonella

(1)

Tuberculosis is a bacterial infection that affects the lungs.

Tuberculosis causes severe discomfort.

(c) What type of medicine should be used to kill the tuberculosis bacteria?

_____ (1)

(d) What type of medicine should be used to treat the symptoms of TB?

_____ (1)

(e) Describe the ways in which the human body defends itself against the tuberculosis bacterium.

_____ (4)

(Total 8 marks)

Q3.

Pathogens cause infectious diseases in animals and plants.

(a) Draw **one** line from each disease to the type of pathogen that causes the disease.

Disease

Type of pathogen

Bacterium

Gonorrhoea

Malaria

Measles

Fungus

Protist

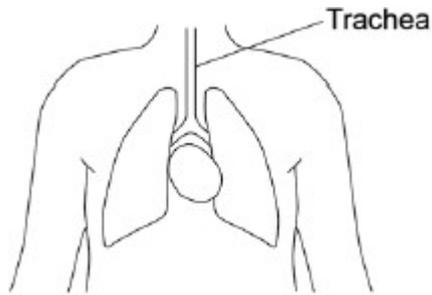
Virus

(3)

- (b) Some parts of the human body have adaptations to reduce the entry of live pathogens.

Look at **Figure 1**.

Figure 1



Explain how the trachea is adapted to reduce the entry of live pathogens.

(4)

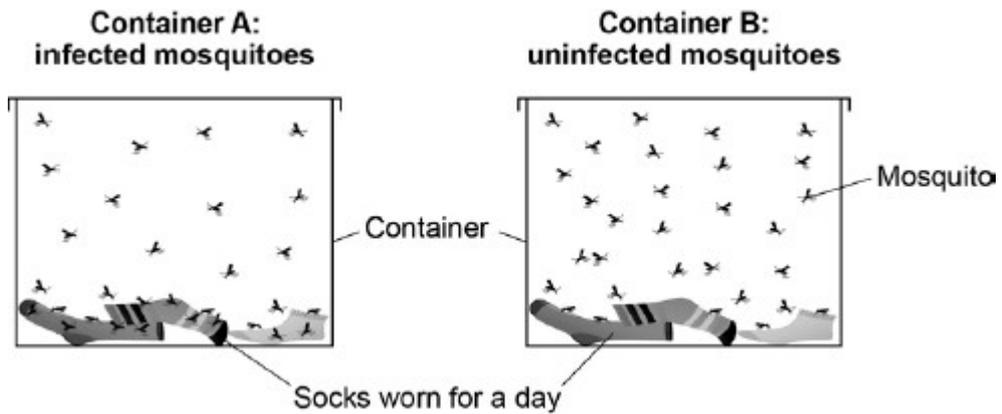
- (c) Malaria is a serious disease that can be fatal.

Malaria is spread to humans by infected mosquitoes.

Scientists investigated the behaviour of mosquitoes to understand how the spread of malaria could be controlled.

Figure 2 shows the equipment the scientists used.

Figure 2



This is the method used.

1. 30 mosquitoes **infected with malaria** were placed in Container **A**.
2. 30 **uninfected** mosquitoes were placed in Container **B**.
3. The total number of times the mosquitoes landed on the socks was recorded.

Name the dependent variable and suggest **one** control variable in this investigation.

Dependent variable _____

Control variable _____

(2)

- (d) Infected mosquitoes landed on the socks three times more often than uninfected mosquitoes.

Explain how this information can be used to reduce the spread of malaria.

(2)

- (e) Tobacco mosaic virus (TMV) affects many species of plant.

Figure 3 shows a leaf infected with TMV.

Figure 3



Yellow patches where TMV has destroyed chloroplasts

© Nigel Cattlin/Getty Images

TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

(3)

(Total 14 marks)

Q4.

Pathogens are microorganisms that cause infectious disease.

(a) Draw **one** line from each disease to the way the disease is spread.

Disease	Way the disease is spread
Cholera	Animals that draw blood
	Drinking contaminated water

Cold

Droplets in the air when people cough or sneeze

Malaria

Eating food that is contaminated

Breathing air polluted with carbon dioxide

(3)

- (b) One way the human body protects itself against the entry of pathogens is by producing antimicrobial chemicals.

Antimicrobial chemicals kill pathogens.

Give **two** other ways the human body protects itself against the **entry** of pathogens.

1. _____

2. _____

(2)

- (c) Measles is a childhood disease caused by a microorganism.

Measles is **not** treated by antibiotics.

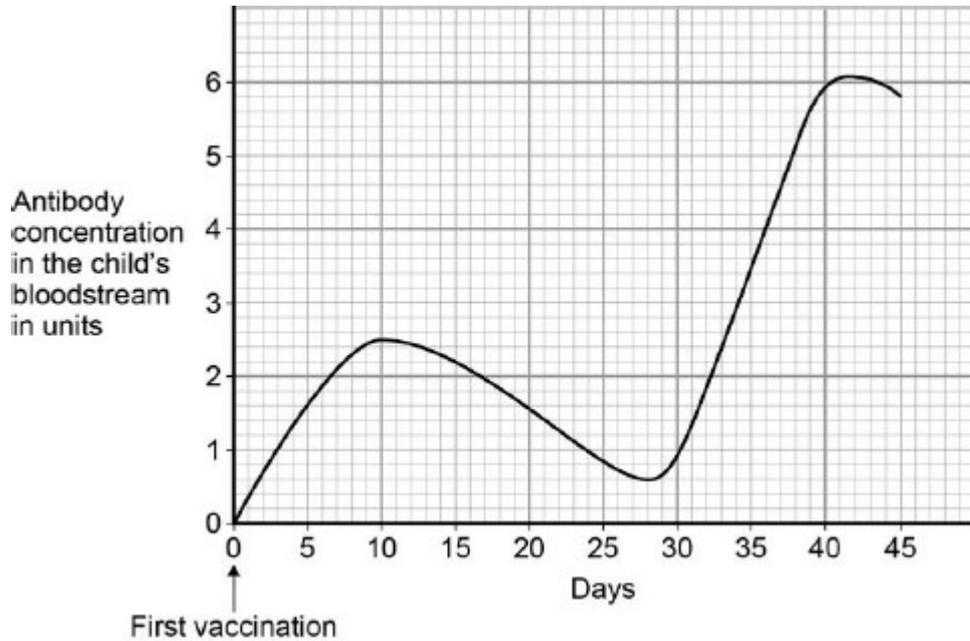
Give the reason why.

(1)

- (d) Vaccinations help people become immune to infections.

In 2013, 92% of children in the UK had two vaccination injections against measles.

The figure below shows how the concentration of antibodies in the blood changes after each measles vaccination.



Suggest what day the second vaccination was given.

_____ (1)

(e) What is the highest concentration of antibodies produced by the first vaccination?

_____ (1)

(f) How will the number of children getting measles change as more children are vaccinated against measles?

Give a reason for your answer.

Change _____

Reason _____

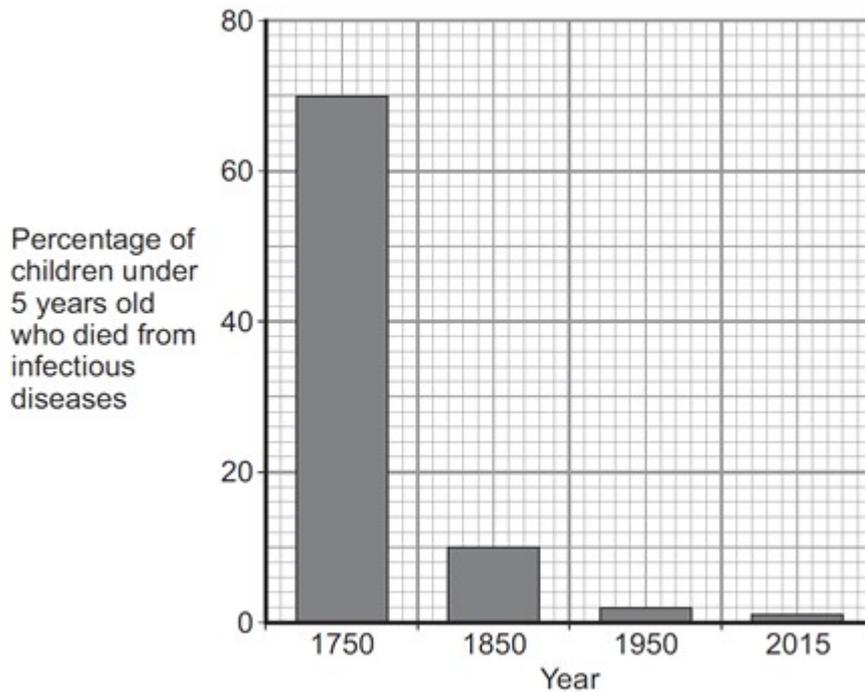
_____ (2)

(Total 10 marks)

Q5.

Pathogens are microorganisms that cause infectious diseases.

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



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

Tick (✓) **one** box.

large amounts of dead pathogens

large amounts of live pathogens

small amounts of dead pathogens

(1)

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

Describe the effect these advances had between 1750 and 1850.

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

(2)

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

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

Draw a ring around the correct answer.

cholesterol

penicillin

thalidomide

(1)

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

Suggest **two** reasons why.

1. _____

2. _____

(2)

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

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

(1)

(Total 7 marks)

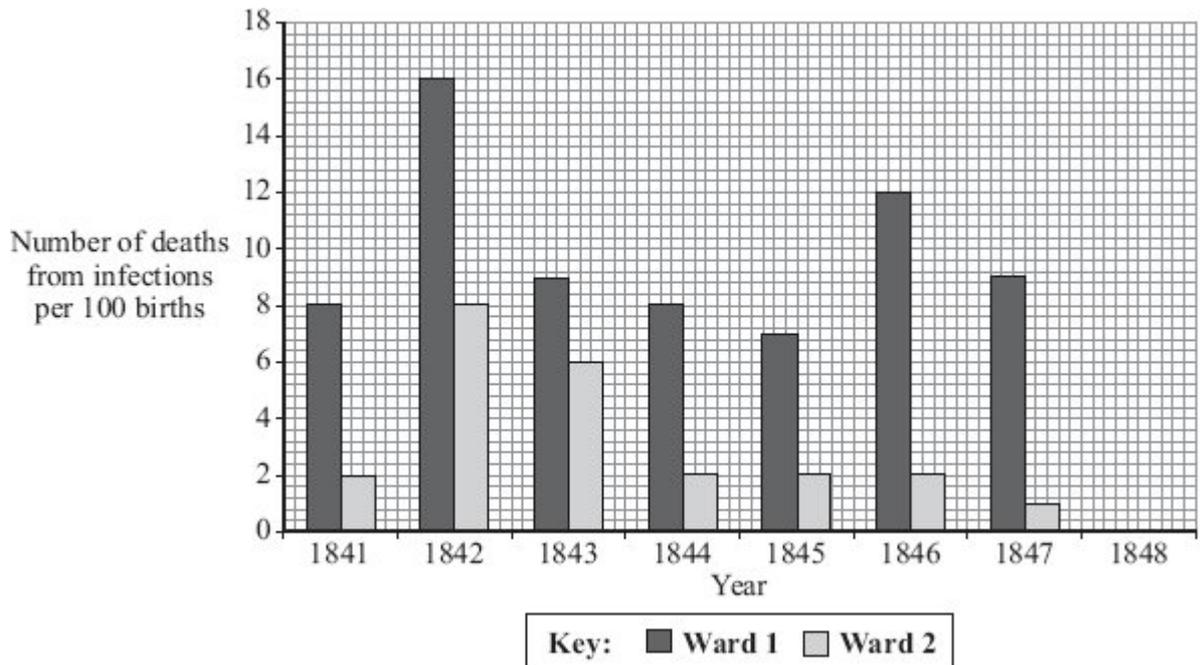
Q6.

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
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(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)

Mark schemes

Q1.

- (a) virus
allow viral
ignore communicable / airborne / microorganism / microbe
do not accept bacteria / bacterial / fungus / fungal / protist 1
- (b) white blood cells 1
- (c) 57
allow any answer in range 55–59 1
- (d) 85
allow any answer in range 84–86 1
- (e) children are less likely to come into contact with someone with the disease 1

more people will have the correct antibodies 1
- (f) any **two** from:
 - cost (to the NHS / government)
 - money saved through not treating people with chickenpox
 - how effective the vaccine is
 - severity of the disease
 - less effect of disease on people with weaker immune systems / elderly / HIV or on unborn babies 2

[8]

Q2.

- (a) a disease that can be spread from one person to another 1
- (b) gonorrhoea 1
- (c) antibiotics 1
- (d) painkillers
allow aspirin, paracetamol, ibuprofen and other correct brand names 1
- (e)

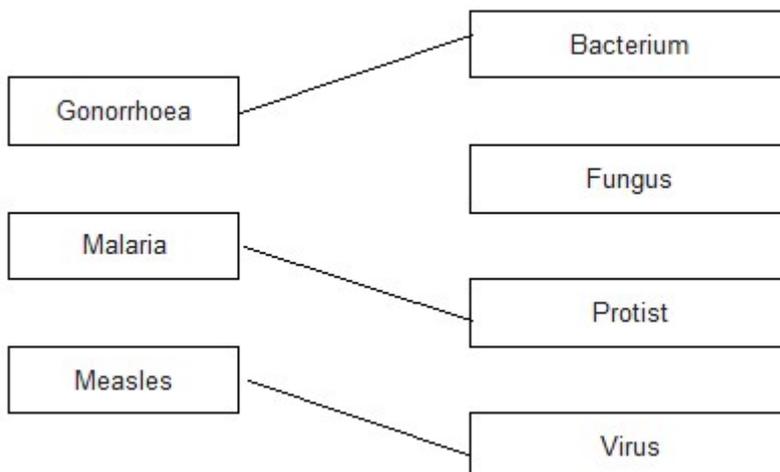
Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3-4
Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1-2
No relevant content	0
Indicative content <ul style="list-style-type: none"> • skin stops the bacterium (entering the body) • blood clots to stop bacteria entering (through cuts) • stomach acid will kill the bacterium (if it is in food) • nose / trachea have mucus to trap the (tuberculosis) bacteria • nose / trachea have cilia / hair to move mucus out • white blood cells destroy the bacteria if infected • by phagocytosis • by antibodies • by antitoxins 	

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Q3.

(a)



3

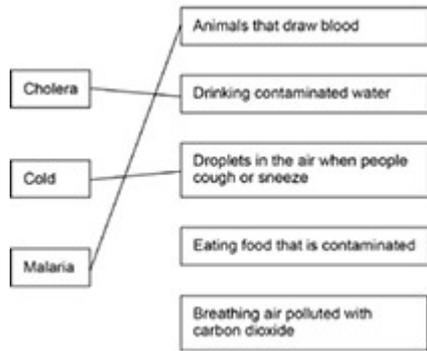
(b) (trachea) has mucus

	to <u>trap</u> pathogens	1
	(trachea) has cilia	1
	to <u>move</u> mucus out of trachea	1
(c)	dependent variable: number of times mosquitoes landed on socks	1
	control variable: any one from:	
	<ul style="list-style-type: none"> • number of mosquitoes in each container • length of time socks worn • dampness of socks • same type of socks • size of container • time • temperature • species of mosquito • age of mosquito 	1
(d)	use worn socks or use chemical from worn socks	1
	to attract / trap infected mosquitoes	1
	<i>or accept:</i> <i>wear clean socks / change socks regularly (1)</i> <i>to reduce the chance of attracting mosquitoes (1)</i>	
(e)	less chlorophyll present	1
	(so) less light absorbed	1
	(so) reduced photosynthesis or (so) less sugar / food made	1

[14]

Q4.

(a)	Disease	Way the disease is spread
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extra lines from left cancel the mark

3

(b) any **two** from:

- skin acts as a barrier
- blood clots (over cuts)
- nose (hairs) catch particles (breathed in)
- mucus (in trachea / bronchi) traps microorganisms
- acid in stomach kills microorganisms

2

(c) because measles is a virus

1

(d) 28 / twenty eight

± 0.5 small square tolerance

1

(e) 2.5

1

(f) number will decrease

1

less likely to come into contact with someone with measles / the disease

1

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Q5.

(a) (i) small amounts of dead pathogens

1

(ii) decrease

1

by 60 (%)

allow from 70(%) to 10(%)

allow other correct data treatment

1

(b) (i) penicillin

1

(ii) any **two** from:

- antibiotics only kill bacteria
- allow antibiotics do not kill viruses*

- some bacteria are resistant (to antibiotics)
allow MRSA not killed by antibiotics
- (correct) antibiotics not always used
allow course not completed
- deficiency disease(s) not caused by bacteria **or** cannot be treated by antibiotics
- inherited disease(s) not caused by bacteria **or** cannot be treated by antibiotics
- 'lifestyle' diseases not caused by bacteria **or** cannot be treated by antibiotics
eg heart disease / cancer
*if no other mark given allow 1 mark for not all diseases are caused by bacteria **or** some diseases are caused by viruses*

2

- (c) bacteria grow faster
allow this is body temp (at which pathogens grow)

1

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Q6.

- (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

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