4.3 Infection and Response Foundation

Name: __________________________
Class: __________________________
Date: __________________________

Time: 122 minutes
Marks: 119 marks
Comments: 

Q1.
The figure below shows a scale drawing of one type of cell in blood.

(a) Use the scale to determine the width of the cell.
Give your answer to the nearest micrometre.

___________________________________________________________________
___________________________________________________________________

Width of cell = _________________ micrometres

(b) Complete the table below.

<table>
<thead>
<tr>
<th>Part of the blood</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Carries oxygen around the body</td>
</tr>
<tr>
<td></td>
<td>Protects the body against infection</td>
</tr>
<tr>
<td>Plasma</td>
<td></td>
</tr>
</tbody>
</table>

(c) Platelets are fragments of cells.
Platelets help the blood to clot.
Suggest what might happen if the blood did not clot.

___________________________________________________________________
___________________________________________________________________

(1)
Q2.
Pathogens cause infectious diseases in animals and plants.

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

<table>
<thead>
<tr>
<th>Disease</th>
<th>Type of pathogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gonorrhoea</td>
<td>Bacterium</td>
</tr>
<tr>
<td>Malaria</td>
<td>Fungus</td>
</tr>
<tr>
<td>Measles</td>
<td>Protist</td>
</tr>
<tr>
<td></td>
<td>Virus</td>
</tr>
</tbody>
</table>

(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.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
(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](image)

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 __________________________________________________________

(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

TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

(3)
(Total 14 marks)

Q3.
Pathogens are microorganisms that cause infectious disease.

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

<table>
<thead>
<tr>
<th>Disease</th>
<th>Way the disease is spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals that draw blood</td>
<td></td>
</tr>
</tbody>
</table>
(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. _________________________________________________________________
   ___________________________________________________________________

(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)

Q4.

Diphtheria is a disease of the human breathing system. The graph shows the number of deaths from diphtheria in the United Kingdom between 1938 and 1951. Vaccination against diphtheria was begun in 1941.
(a) What evidence in the graph suggests that vaccination protects people from diphtheria?

___________________________________________________________________

(1)

(b) Complete the passage by choosing the correct words from the box.

antibodies  bacteria  platelets
red blood cells  white blood cells

During vaccination, harmless ________________________ are injected into the body.

This causes ______________________ to make ______________________

which help to protect the body against diphtheria.

(3)

(Total 4 marks)

Q5.

Drugs affect our body chemistry.

(a) List A gives the names of some drugs. List B gives the uses of some drugs.

Draw one line from each drug in List A to the use of the drug in List B.

List A
Drug

List B
Use

To increase fertility in women
(b) A new drug was trialled on 80 healthy volunteers. The volunteers were asked to report any side effects.

The results of the trial are shown in the table.

<table>
<thead>
<tr>
<th>Reported effects</th>
<th>Number of volunteers</th>
</tr>
</thead>
<tbody>
<tr>
<td>No side effects</td>
<td>20</td>
</tr>
<tr>
<td>Severe sickness</td>
<td>42</td>
</tr>
<tr>
<td>Itchy skin</td>
<td>18</td>
</tr>
</tbody>
</table>

Based on the results of this trial, what should the drug company do next?

Tick (✓) one box.

Test on a small group of patients to find the optimum dose □

Test on a large group of patients to see if the drug works on ill people □

Stop the trial □

Give a reason for your answer.

___________________________________________________________________
___________________________________________________________________

(Total 5 marks)

Q6.

A scientist investigated how effective 5 different antibiotics were at killing two types of bacteria, \textit{E.coli} and \textit{S.aureus}.

• The scientist grew the bacteria on agar in two different Petri dishes.
He placed paper discs soaked in the 5 different antibiotic solutions, A, B, C, D and E, onto the agar.

He used the same concentration of each antibiotic and the same sized paper discs.

The Petri dishes were incubated at 25°C for 3 days.

A clear area around the paper disc means that the antibiotic has killed the bacteria there.

The results are shown in the diagram.

(a) Give one variable the scientist controlled.

___________________________________________________________________ (1)

(b) Use the results shown in the diagram to help you to answer the following questions.

(i) Which antibiotic, A, B, C, D or E, was the most effective at killing E.coli?

Write the correct answer in the box. (1)

(ii) Which antibiotic, A, B, C, D or E, did not kill either E.coli or S.aureus?

Write the correct answer in the box. (1)

(iii) Which antibiotic, A, B, C, D or E, would be the best to use to kill both E.coli and S.aureus?

Antibiotic: _______________

Give a reason for your answer.
MRSA is a strain of *S. aureus*. MRSA cannot be killed by most antibiotics.

Draw a ring around the correct answer to complete the sentence.

Bacteria that cannot be killed by antibiotics are  

- immune.  
- powerful.  
- resistant.

Q7.

The body defends itself against pathogens.

(a) Give **three** ways that white blood cells defend the body against pathogens.

Tick (✓) **three** boxes.

- Ingest pathogens
- Produce antibiotics
- Produce antibodies
- Produce antibodies
- Produce antitoxins
- Produce vaccines
- Stop pathogens entering the body

(b) Bacterial infections can be treated with antibiotics. Sometimes bacteria are resistant to antibiotics.

What does *resistant to antibiotics* mean?
The bar chart shows how the percentage of strains of pneumonia bacteria that are resistant to four different antibiotics changed between 1995 and 1997.

(i) Which would have been the best antibiotic to use against pneumonia bacteria in 1995?

Write the correct answer in the box.  

Antibiotic

(ii) Calculate the change in the percentage of strains of pneumonia bacteria resistant to antibiotic W between 1995 and 1997.

Show clearly how you work out your answer.

________________________________________________________________________________________

Answer = ____________________ %

(iii) Suggest two possible reasons for this change in the number of strains of pneumonia bacteria resistant to antibiotic W.

1. ____________________________________________________

2. ____________________________________________________
Q8.

Two common medicines are paracetamol and ibuprofen. These medicines help to reduce high body temperature.

(a) Children who were ill with high body temperatures were identified at doctors’ surgeries.

These children were put into two groups.
The children in each group were matched for age, gender and body mass.

Group 1: 50 children were given paracetamol.

Group 2: 50 children were given ibuprofen.

(i) Give one control variable in this investigation.

__________________________________________________________________________________

__________________________________________________________________________________

(1)

(ii) In some investigations when medicines are tested, a placebo is given to one group.

What is a placebo?

__________________________________________________________________________________

__________________________________________________________________________________

(1)

(b) The children’s body temperatures were measured before any medicine was given and every hour after treatment started.

Paracetamol was given every 4 hours. Ibuprofen was given every 6 hours.

The results for the two groups are shown in the figure below.
(i) What was the mean body temperature 4 hours after paracetamol was given?

_____________________________________________ °C

(1)

(ii) Suggest which medicine a parent should give to their child to reduce a high body temperature to normal.

Use information from the graph.

Medicine: ______________________

Give two reasons for your answer.

_____________________________________________________

____________________________________________________________

____________________________________________________________

____________________________________________________________

____________________________________________________________

(2) (Total 5 marks)

Q9.

New drugs have to be tested before they can be sold.

The graph shows how much time the different stages of testing took for a new drug.
(a) (i) How much time did the laboratory testing of the drug take?

____________________ years

(1)

(ii) Suggest what the drug was tested on during laboratory testing.

______________________________________________________________

(1)

(b) Clinical trials are carried out on human volunteers and patients.

(i) How much time did the clinical trials take for this drug?

______________________________________________________________

____________________ years

(2)

(ii) During **Phase 1** clinical trials, the drug is tested on healthy volunteers using low doses.

Draw a ring around the correct answer to complete the sentence.

The reason for **Phase 1** testing is to

- find the best dose.
- see if the drug works.
- see if the drug has side effects.

(1)

(iii) During **Phase 2** and **Phase 3** clinical trials, half of the volunteers are given a fake drug called a placebo in a double blind trial.

In a double blind trial, who knows which volunteers are given the drug and which volunteers are given the placebo?
Q10.
Scientists investigated the effect of different factors on health.

(a) People who are not active may have health problems.

The graph shows the percentage of 16-year-olds in some countries who are not active.

(i) What percentage of 16-year-olds in the UK are not active?

____________%  

(ii) What percentage of 16-year-olds in the UK are active?

____________%
A newspaper headline states:

People in the UK are the laziest in the world.

Information in Figure 1 does not support the newspaper headline.

Suggest one reason why the newspaper headline may be wrong.

___________________________________________________________________

___________________________________________________________________

(b) Doctors gave a percentage rating to the health of 16-year-olds. 100% is perfect health.

The table shows the amount of exercise 16-year-olds do and their health rating.

<table>
<thead>
<tr>
<th>Amount of exercise done in minutes every week</th>
<th>Health rating as %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30</td>
<td>72</td>
</tr>
<tr>
<td>90</td>
<td>76</td>
</tr>
<tr>
<td>180</td>
<td>82</td>
</tr>
<tr>
<td>300</td>
<td>92</td>
</tr>
</tbody>
</table>

What conclusion can be made about the effect of exercise on health?

Use information from the table.

___________________________________________________________________

___________________________________________________________________

(c) Inherited factors can also affect health.

Give one health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

being malnourished having a high cholesterol level having a deficiency disease

(d) White blood cells are part of the immune system.

Use the correct answer from the box to complete each sentence.
antibiotics | antibodies | pathogens | vaccines

(i) When we are ill, white blood cells produce ______________________ to kill microorganisms.  

(ii) Many strains of bacteria, including MRSA, have developed resistance to drugs called  

______________________________________________________________________________  

(Total 7 marks)

Q11.

Bacteria and viruses can reproduce quickly inside the body and make people feel ill.

(a) Use the correct answer from the box to complete the sentence.

antibodies | antitoxins | toxins

Bacteria and viruses make us feel ill because they produce __________________ .  

(b) (i) Antibiotics can be used to treat some infections.

Use the correct answer from the box to complete the sentence.

bacteria | bacteria and viruses | viruses

Antibiotics are medicines that kill __________________ .  

(ii) New strains of pathogens have developed which are resistant to antibiotics.

Use the correct answer from the box to complete the sentence.

are short of food | invade body cells | mutate

New strains are produced when pathogens __________________ .  

(iii) What will scientists have to develop to kill these new resistant strains?

______________________________________________________________________________  

______________________________________________________________________________  

(Total 4 marks)

Q12.

Flu is an infectious disease caused by a virus.
Many people in England become infected with the flu virus in winter.

(a) Doctors do not prescribe antibiotics to patients with flu. Doctors do not prescribe antibiotics to patients with flu.

State why.

___________________________________________________________________
___________________________________________________________________

(b) A flu vaccine is offered to people with a high risk of having a severe illness if they are infected by the flu virus.

What does a flu vaccine contain?

Tick (√) one box.

Inactive antibodies
Inactive viruses
White blood cells

(c) The table shows the percentage of people in high-risk groups who had been vaccinated against flu by November in 2013. The data is for England.

<table>
<thead>
<tr>
<th>Group at risk of a severe illness</th>
<th>Percentage (%) of group vaccinated by November in 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-year-old children</td>
<td>31.1</td>
</tr>
<tr>
<td>3-year-old children</td>
<td>27.9</td>
</tr>
<tr>
<td>People 65 years and older</td>
<td>64.4</td>
</tr>
</tbody>
</table>

Give one conclusion from the data in the table above.

Suggest a reason for this.

Conclusion: ____________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Reason: ______________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

(1)
Q13.

The photograph below shows human skin highly magnified. Groups of microbes can be seen on the skin.

![Microbes](image)

Give two ways in which the body protects itself from these microbes.

1. ________________________________________________________________
   _______________________________________________________________________

2. _____________________________________________________________________
   ________________________________________________________________

(Total 2 marks)

Q14.

The mould *Penicillium* can be grown in a fermenter. *Penicillium* produces the antibiotic penicillin.

The graph shows changes that occurred in a fermenter during the production of penicillin.
(a) During which time period was penicillin produced most quickly?

Draw a ring around one answer.

- 0 – 20 hours
- 40 – 60 hours
- 80 – 100 hours

(1)

(b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

(ii) How does the change in the concentration of oxygen in the fermenter compare with the change in concentration of glucose between 0 and 30 hours?

Tick (✓) two boxes.

- The oxygen concentration changes after the glucose concentration.
- The oxygen concentration changes before the glucose concentration.
The oxygen concentration changes less than the glucose concentration.

The oxygen concentration changes more than the glucose concentration.

(iii) What is the name of the process that uses glucose?

Draw a ring around one answer.

| distillation | filtration | respiration |

Q15.

In the eighteenth century, surgeons did not wear special clothing or wash their hands before operations. Many of their patients died from infections.

(a) Suggest why patients often died from infections after operations.

_________________________________________

(b) In the nineteenth century, Joseph Lister told surgeons to use sprays of carbolic acid in operating theatres and to wash their hands.

The graph shows the effect that using Lister’s instructions had on the number of patients who died from infections after surgery.

Describe how Lister’s instructions affected the number of patients dying from infections after surgery.

_________________________________________
Q16.

Scientists began to keep records of cases of H5N1 bird flu in humans in January 2004.

The graph shows the total number of cases of bird flu in humans and the total number of deaths up to January 2006.

(a) (i) How many people had died from bird flu up to 01/07/05?

(ii) Describe, as fully as you can, how the number of cases of bird flu in humans changed between 01/07/04 and 01/01/06.
At present, humans can only catch bird flu from contact with infected birds. The bird flu virus may mutate into a form that can be passed from one human to another.

Explain why millions of people may die if the bird flu virus mutates in this way.
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

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

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

(iii) The vaccine stimulates the white blood cells to

produce antibiotics
antibodies
drugs
which destroy the virus.

(b) The graph shows the number of cases of polio in the UK between 1948 and 1968.
Q18.

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.

<table>
<thead>
<tr>
<th>Ward</th>
<th>Number of deaths from infections per 100 births</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward 1</td>
<td>3</td>
</tr>
<tr>
<td>Ward 2</td>
<td>1</td>
</tr>
</tbody>
</table>
(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)

Q19.
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)
Q20.

Obesity is linked to several diseases.

(a) Name two diseases linked to obesity.

1. ______________________________________________________________
2. _______________________________________________________________

(b) Scientists trialled a new slimming drug.

The table shows their results after one year.

<table>
<thead>
<tr>
<th>Percentage change in mass of each volunteer</th>
<th>Number of volunteers</th>
</tr>
</thead>
<tbody>
<tr>
<td>gained mass or lost 0 to 3.9 %</td>
<td>1900</td>
</tr>
<tr>
<td>lost 4.0 to 4.9 %</td>
<td>1100</td>
</tr>
<tr>
<td>lost 5.0 to 9.9 %</td>
<td>1500</td>
</tr>
<tr>
<td>lost 10 % or more</td>
<td>1500</td>
</tr>
</tbody>
</table>

(i) Calculate the proportion of the volunteers who lost 10 % or more of their mass.

You should first calculate the total number of volunteers, then work out the proportion.

Proportion of volunteers = ______________________

(ii) The National Health Service (NHS) gave permission for the drug to be used.

Use information from the table to suggest a reason why the NHS gave permission for the drug to be used.

(Total 5 marks)
Q1.

(a)  8 (micrometres)  

(b)  red blood cell(s)  

white blood cell(s)  

accept named cell  

eg phagocyte / lymphocyte  

(plasma)  

transports proteins / dissolved substances / food (molecules) / urea / hormones / blood cells  

(c)  any one from:  

- you could lose a lot of blood  
- bleed internally  

allow bleeding would not stop  

allow could bleed to death  

[5]  

Q2.

(a) 

(b)  (trachea) has mucus  

trap pathogens  

(trachea) has cilia
to move mucus out of trachea

(c) dependent variable:
    number of times mosquitoes landed on socks

control variable:
    any one from:
    • 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

(d) use worn socks
    or
    use chemical from worn socks

    to attract / trap infected mosquitoes

    or accept:
    wear clean socks / change socks regularly (1)
    to reduce the chance of attracting mosquitoes (1)

(e) less chlorophyll present

    (so) less light absorbed

    (so) reduced photosynthesis
    or
    (so) less sugar / food made

Q3.
(a) Disease      Way the disease is spread

[Diagram showing: Cholera, Cold, Malaria]

extra lines from left cancel the mark
(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

(c) because measles is a virus

(d) 28 / twenty eight
    \[ \pm 0.5 \text{ small square tolerance} \]

(e) 2.5

(f) number will decrease
    less likely to come into contact with someone with measles / the disease

Q4.
(a) decrease in number of deaths (after vaccination started)

(b) in correct sequence:
    bacteria
    white blood cells
    antibodies

Q5.
(a) one mark for each correct line
extra line from drug negates mark

(b) stop the trial

second mark scores only if first mark correct
side effects too severe
allow people might die / get ill / harmed
or
(too) many people had side effects
allow use of numbers from table
ignore itchy skin

Q6.

(a) any one from:
• amount / concentration of antibiotic
do not allow type of antibiotic ignore number of antibiotics
allow type of paper
• size of discs
ignore number / position of discs
• (incubation) temperature
• incubated for same time / 3 days
allow left / kept for same time
• type of agar
ignore references to bacteria or petri dishes

(b) (i) D
     (ii) C
     (iii) B
     no marks if wrong antibiotic
both had a large clear area around the disc
allow a description of this, eg B had the 2nd largest clear area
with E.coli and the largest clear area on S.aureus
or
killed a lot of both bacteria

(c) resistant
Q7.
(a) ingest pathogens
produce antibodies
produce antitoxins
deduct 1 mark for each extra box ticked
(b) are not killed / affected (by antibiotic)
allow antibiotic does not work / does not cure
allow bacteria immune (to antibiotic)
allow infection not killed
ignore bacteria mutated
(c) (i) (antibiotic) Y
(ii) 8
allow 54 - 46 for 1 mark
(iii) any two from:
• overuse / widespread use/ over prescription
  OWTTE
• inappropriate use / use for eg sore throats / viral infections
• mutation / change to DNA (in bacteria)
• natural selection / description
  ignore people not finishing course of antibiotics
  ignore wrong antibiotic given

Q8.
(a) (i) any one from:
• age
• gender
• body mass
• number in group / 50
  allow number of children
• high body temperature
  allow starting temperature
  allow dose / amount of drug given
(ii) any one from:
• tablet that does not contain a drug / anything
  allow sugar pill
do **not** allow a different drug

- fake drug

(b) (i) 38.2 (°C)

(ii) ibuprofen

*no mark for drug*  
*no marks if wrong drug selected*

any **two** from:

- reduced body temperature fast(er)  
  *allow acts fast(er)*
- maintained temperature in normal range / around 37 °C (longer / for several hours)
- paracetamol did not reduce temperature to normal / 37 °C  
  *accept ibuprofen did reduce temperature to normal / 37 °C*
- ibuprofen given less frequently  
  *allow less drug needed*  
  *ignore cheaper unless qualified*

Q9.

(a) (i) 4 / four (years)

(ii) any **one** from:

- animals  
  *allow suitable examples eg rats*  
  *do **not** allow humans / plants*
- (living) cells  
  *allow human cells*  
  *do **not** allow plant cells*
- (living) tissues  
  *allow human tissues*  
  *do **not** allow plant tissues*

(b) (i) 9 (years)

*allow 1 mark for 13 – 4*  
*or*  
*2 + 3 + 4*

(ii) see if the drug has side effects

(iii) neither the volunteers nor the doctors
Q10.
(a) (i) 64
(ii) 36
   allow e.c.f from (i) i.e. 100 – answer given in (a)(i)
(iii) any one from:
   • only considers 16-year-olds
     ignore lack of evidence
     allow does not refer to all ages
   • only about some / 5 countries
     allow does not refer to all countries.

(b) the more exercise done the healthier a person is
   allow the more exercise done the higher the health rating
   allow the less exercise done the lower the health rating

(c) having a high cholesterol level

(d) (i) antibodies
(ii) antibiotics

Q11.
(a) toxins

(b) (i) bacteria
(ii) mutate
(iii) new / different antibiotic
   allow new / different drug
   do not allow vaccine

Q12.
(a) antibiotics do not kill viruses
   allow antibiotics only kill bacteria
   allow flu is not caused by a bacterium
   or
   antibiotics are not effective against viruses
   allow antibiotics cannot reach viruses inside cells
(b) Inactive viruses

(c) Conclusion:
people 65 years and older had the highest percentage vaccinated.

*ignore references to figures unless qualified*

Reason:
more worried about becoming ill
or
had more time to go to the doctor.

**OR**

Conclusion:
children aged 3-years had the lowest percentage vaccinated.

Reason:
parents didn’t have time to take them to the doctor
or
they had been vaccinated when 2-years old.

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**Q13.**

blood clots to seal cuts;
kills microbes which enter

*each for 1 mark*

*(allow higher level answers)*

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**Q14.**

(a) 40 – 60 hours

(b) (i) decrease

1st slowly then faster / appropriate detail from the graph – e.g. from 7.8 to 0 / faster after 4 – 10h

(ii) oxygen after glucose

*extra box ticked cancels 1 mark*

oxygen less than glucose

(iii) respiration

---

**Q15.**

(a) dirty clothes/equipment/hands passed bacteria

*allow bacteria from any sensible source e.g. surgeon, floor*

**OR**
ease of entry of bacteria (during operations)  
*do not accept germs*

(b) fewer died

indication of reduced number or proportion  
*e.g. 3000 → 600*  
down by 2400  
20% of previous deaths

Q16.  
(a) (i) 56  
accept 54 – 58

(ii) increased

  reasonable qualification eg slowly then more quickly  
or  
to 174 / 176  
or  
by 138 / 140

(b) any two from:  
• no immunity or antibodies ineffective  
  *accept no resistance*  
• no vaccines or humans not immunised  
• idea of large scale contact or large scale travel  
  *do not accept passed on*  
  ignore no cure

Q17.  
(a) (i) lives inside cells

(ii) inactive

(iii) antibodies

(b) (i) 1950

(ii) 8 (years)
(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

Q18.
(a) (i) 12
  correct answer with or without working
  if answer incorrect evidence of (number of deaths) × 6 or 2
  seen gains 1 mark

(ii) (ward 2)
  more deaths / infections on ward 1
  or
  less deaths / infections on ward 2

(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

(ii) less deaths / infections

(iii) bacteria / germs / microbes / infection killed / washed off
  accept less infections passed on

Q19.
(a) (i) antibiotic or named antibiotic
  ignore antibodies
  accept antiseptic
  do not accept disinfectant

(ii) painkillers
  accept named painkillers eg aspirin

(b) (i) 5.5 / 5 ½ weeks

(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

(iii) (no)

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

Q20.

(a) any two from:
   ignore eating disorder
   ignore cancer

• arthritis
   accept worn joints

• diabetes
   accept high blood sugar

• high blood pressure
   ignore cholesterol

• heart disease / heart condition / heart attack / blood vessel disease
   allow blood clots / strokes

(b) (i) \[
\frac{1}{4} \quad \text{or} \quad 0.25 \quad \text{or} \quad 25\%
\]

correct answer gains 2 marks

if answer incorrect, evidence of \[ 1500 \div 6000 \] gains 1 mark

25 without % gains 1 mark

(ii) majority / most / high proportion of people in trial lost mass / weight

ignore good results / it worked

1