Mark schemes

(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

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(a)

Gonorrhoea → Bacterium

Malaria → Fungus

Measles → Protist

(b) (trachea) has mucus
to 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

(a) any one from:

- not all deaths recorded
- not all causes of deaths recorded
  *allow cause may not be known*

(b) antibiotics do not kill viruses

*allow antibiotics only kill bacteria*
(c) Dose
   Side effects making the person ill

   Efficacy
   The concentration of the drug to be used and how often the drug should be given

   Toxicity
   Whether the drug works to treat the illness

   all correct for 2 marks
   1 or 2 correct for 1 mark

(d) any one from:
   • to prevent false claims
   • to make sure the conclusions are correct / valid
   • to avoid bias

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(e) some people would be immune to EVD

allow those vaccinated would not contract the disease

if less people (in a population) have EVD less chance of it being passed on

(f) Level 3 (5–6 marks):

A detailed and coherent evaluation is provided which considers a range of arguments for and against the use of unlicensed drugs and comes to a conclusion consistent with the reasoning.

Level 2 (3–4 marks):

An attempt to give arguments for and against the use of unlicensed drugs is made. The logic may be inconsistent at times but builds towards a coherent argument.

Level 1 (1–2 marks):

Discrete relevant points made. The logic may be unclear and the conclusion, if present, may not be consistent with the reasoning.

0 marks:

No relevant content

Indicative content

pros

- might save some lives
- vaccine could reduce chance of future outbreaks
- patient made aware of risk and agreed to use of drug
- sharing of results could speed up development of effective vaccines / drugs
- used mainly for health workers who were risking their lives to help

cons

- could be dangerous
  or
  vaccine could harm a healthy person
- goes against legislation / laws governing drug development
- might set a precedent for other drugs not to be fully tested
- unfair as not available to the African people

a justified conclusion
(a) **Disease** | **Way the disease is spread**
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td>Drinking contaminated water</td>
</tr>
<tr>
<td>Cold</td>
<td>Droplets in the air when people cough or sneeze</td>
</tr>
<tr>
<td>Malaria</td>
<td>Eating food that is contaminated</td>
</tr>
<tr>
<td>Animals that draw blood</td>
<td>Breathing air polluted with carbon dioxide</td>
</tr>
</tbody>
</table>

(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`

   ± 0.5 small square tolerance

(e) 2.5

(f) number will decrease

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

(a) 55%

   _2 marks for correct answer alone_  
   accept 54 – 56  
   5.5 / 10 × 100 alone gains 1 mark_
(b) any three from:

- amino acids
- antibodies
- antitoxins
- carbon dioxide
- cholesterol
- enzymes
- fatty acid
- glucose
- glycerol
- hormones / named hormones
- ions / named ions
- proteins
- urea
- vitamins
- water.

ignore blood cells and platelets
ignore oxygen
max 1 named example of each for ions and hormones
allow minerals

(c) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a ‘best-fit’ approach to the marking.

0 marks
No relevant content.

Level 1 (1 – 2 marks)
There is a description of pathogens with errors or roles confused.
or
the immune response with errors or roles confused.

Level 2 (3 – 4 marks)
There is a description of pathogens and the immune response with some errors or confusion
or
a clear description of either pathogens or the immune response with few errors or little confusion.

Level 3 (5 – 6 marks)
There is a good description of pathogens and the immune response with very few errors or omissions.
Examples of biology points made in the response:

- bacteria and viruses are pathogens
  
  *credit any ref to bacteria and viruses*
- they reproduce rapidly inside the body
- bacteria may produce poisons / toxins (that make us feel ill)
- viruses live (and reproduce) inside cells (causing damage).

White blood cells help to defend against pathogens by:

- ingesting pathogens / bacteria / (cells containing) viruses
  
  *credit engulf / digest / phagocytosis*
- to destroy (particular) pathogen / bacteria / viruses
- producing antibodies
- to destroy particular / specific pathogens
- producing antitoxins
- to counteract toxins (released by pathogens)
  
  *credit memory cells / correct description*
- this leads to immunity from that pathogen.

(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
(a) any two from:
- only one ‘chromosome’
  allow one strand of DNA
- circular
  allow loop
- may have plasmids
- not in a nucleus / no nucleus

(b) (i) any one from:
- London is much higher
  or converse
- more variable / wider range
  allow ‘on average it is 5 / 6 times greater’

(ii) increases
  Included figures must be correct

(iii) overall slight increase
  accept ‘doesn’t change much’
  variable / goes up and down

(c) (i) both axes correctly labelled
  x = Year
  y = Number of cases
  correct points
  all correct = 2 marks
  1-2 errors = 1 mark
  > 2 errors = 0 marks
  suitable line of best fit
  accept straight line or smooth curve

(ii) doesn’t fit the pattern / line of best fit

(d) provides immunity / protection (to TB)
  ignore ‘stops people catching it’
  ignore ‘resistance’
prevents TB spreading
accept ref to herd immunity

(a) (i) any one from:
• (produce) toxins / poisons
• (cause) damage to cells
  kill / destroy cells
  allow kills white blood cells

(ii) produce antitoxins

  engulf / ingest / digest pathogens / viruses / bacteria / microorganisms
  accept phagocytosis or description
  ignore eat / consume / absorb for engulf
  ignore references to memory cells

(b) (i) dead / inactive / weakened
  accept idea of antigen / protein

  (measles) pathogen / virus
  ignore bacteria

(ii) (after infection)
  accept converse if clearly referring to before vaccination

  rise begins sooner / less lag time
  steeper / faster rise (in number)

  longer lasting or doesn’t drop so quickly
  idea of staying high for longer
  ignore reference to higher starting point

(iii) antibodies are specific or needs different antibodies
  accept antigens are different or white blood cells do not recognise virus
(c) reduces **spread** of infection / less likely to get an epidemic

  accept idea of eradicating measles

  

(a)  

(i) viruses live inside cells

viruses inaccessible to antibiotic

  *allow drug / antibiotic (if used)*

  *would (have to) kill cell*

(ii) any **two** from eg

  - non-resistant strains killed (by antibiotics)
  
  - so less competition
  
  - overuse of antibiotics / antibiotics prescribed for mild infections

  *if no marks gained allow one mark for ‘people do not finish course of antibiotics’*

(b) (stimulate) antibody production

  ignore antitoxin

  (by) white cells

  rapidly produce antibody on re-infection

  ignore antibodies remain in blood