B3
INFECTION & RESPONSE
TEST 3
1. **Disease**  
   **Way the disease is spread**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Way the disease is spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td>Animals that draw blood</td>
</tr>
<tr>
<td></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></td>
<td>Breathing air polluted with carbon dioxide</td>
</tr>
</tbody>
</table>

extra lines from left cancel the mark

2. (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

3. (c) because measles is a virus

4. (d) 28 / twenty eight
   ± 0.5 small square tolerance

5. (e) 2.5

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

[10]

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

8. (ii) produce antitoxins

9. [Mark schemes]
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

[10]
(a) **antigen** (in vaccine) stimulates white blood cells
   
   *allow leucocytes / lymphocytes do not accept phagocytes*

   to produce specific antibodies

   (so) if the person ingests salmonella
   
   *allow idea of secondary exposure*

   (so on secondary exposure to antigen / bacteria white blood cells) produce the (correct) antibodies faster or in larger quantities
   
   *allow idea of memory cells produced*

   (so) toxins (produced by the bacteria) don’t reach high enough concentrations / levels (to make the person have symptoms)

(b) (random) mutations (in the population of bacteria)
   
   *do not accept bacteria deliberately mutate*

   (so that) resistant salmonella / bacteria are not killed by the antibiotic / nalidixic acid
   
   *allow those bacteria without the mutation are killed by antibiotic / nalidixic acid do not accept immune bacteria*

   (so) these bacteria reproduce to pass on the gene for resistance (to their offspring)

(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

*1*
A

Tests including a placebo

Tests using very small ...

Tests on animals

B

Used to find whether the drug is toxic

The first stage in the clinical trials of the drug

Used to find the optimum dose of the drug

Used to prove that the drug is effective on humans

1 mark for each correct line
mark each line from left hand box
two lines from left hand box cancels mark for that box
(b) any three from:

> Students have been informed that the headline is not justified

- reference to reliability, eg only a small number of mice tested
  **or** trial too short
  **or** investigation not repeated

- reference to control, eg mice given caffeine **not** coffee
  **or** 6 cups (equivalence) is more than 1 dose

- (and) the effect on mice might not be same as on humans
  *allow only tested on mice*

- (also) text suggests that the treatment improves memory loss (rather than delays it)
  *accept text suggests disease cured*
  **or** mice already have memory loss or experiment only showed improvement in memory
  **or** does not show **delays** Alzheimer’s
  **or** experiment not done on old mice
  *allow reference to the fact that mice engineered to have it*

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(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

(a) dead or inactive or weak form of pathogen / bacterium / virus / microorganism introduced
ignore disease / germ
(stimulates) white cells / lymphocytes / leucocytes
accept B and T cells
ignore phagocytes
to produce antibodies
ignore antitoxins / antigens
antibodies made quickly on re-infection / idea of memory cells
ignore already has antibodies
ignore ‘body remembers’

(b) (i) alters / causes chemical processes / body chemistry
ignore craving / withdrawal symptoms
(ii) any two from:
  • combined molecule / vaccine stimulates antibody production
  • if nicotine taken, antibodies bind to nicotine molecules
    ignore destroys nicotine
  • making them too large to get to brain / making them ineffective
    allow prevents nicotine entering brain

(a) (i) any one from:
  • cells
  • tissues
  • (live) animals / named
    allow mammals
(ii) any three from:

(to test for)

• toxicity / check not poisonous / not harmful  
  allow side-effect  
  allow converse

• interaction with other drugs

• efficacy or to see if they work or check if they treat the disease  
  allow converse

• dosage or how much is needed

(b) argued evaluation

comparison can be written anywhere in evaluation allow use of 
‘only’ for implied comparison for each point eg only statins damage  
muscles / kidneys / organs

any six from:

• statin can damage / muscles / kidneys / organs but cholesterol blockers don’t  
  ignore liver  
  if neither of the first 2 points are given accept for 1 mark

• statins can cause death but cholesterol blockers don’t  
  statins are more dangerous than cholesterol blockers or statins have more side effects

• cholesterol blockers can interfere with action of other drugs but statins don’t

• statins are for a life time but cholesterol blockers are not

• statins (might) reduce cholesterol to zero but cholesterol blockers only reduce it or statins reduce cholesterol more  
  allow statins (might) stop membrane / hormone production but  
  cholesterol blockers don’t

• statins better for people with inherited high cholesterol

• cholesterol blockers better for people with dietary cholesterol problems

• taking/using statins/cholesterol blockers is better than dying from heart attack or build up of fat in blood vessels or reduced blood flow

[10]