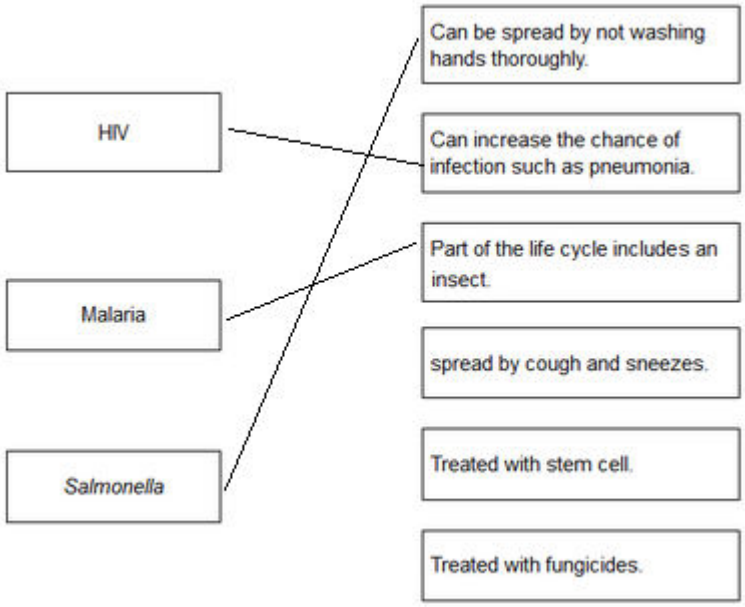
Mark schemes

1 (a)



each extra line negates a mark

4

(b) pain when urinating

1

yellow discharge

1

(c) three correct plots

*allow **1** mark for two correct plots*

2

correctly drawn line

1

(d) any **three** from:

- (fairly) level / steady up to 2009

  *allow numbers of males fall (slightly) **and** females rise (slightly) up to 2009*
- (there is a) rise after 2009
- males are (always) higher than females
- males rising faster than females

  allow overall increase (from 2005 to 2013)

3

(e) HIV is a virus

1

(and) antibiotics are only effective against bacteria
or
antibiotics do not kill viruses

allow viruses live inside cells

1

[13]

2 (a) to kill virus
or
to prevent virus spreading

1

(b) take (stem) cells from meristem
or
tissue culture

allow take cuttings

1

(c) use Benedict's solution

1

glucoses turns solution blue to orange

1

(d) **Level 2 (3–4 marks):**
A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points that explain why plants with TMV have stunted growth.

Level 1 (1–2 marks):
Simple statements are made, but not precisely. The logic is unclear.

0 marks:
No relevant content.

Indicative content

- less photosynthesis because of lack of chlorophyll
- therefore less glucose made
  so
- less energy released for growth
- because glucose is needed for respiration
  and / or
- therefore less amino acids / proteins / cellulose for growth
- because glucose is needed for making amino acids / proteins / cellulose

4

[8]

3 (a) any **two** from:

- acid in the stomach kills pathogens in food
- skin forms a barrier / produces antimicrobial secretions
- hairs in the nose trap (particles which may contain) pathogens
- trachea / bronchi has mucus which traps pathogens
  or
  bronchi have cilia which waft mucus to throat to be swallowed

2

(b) **Level 3 (5–6 marks):**
A clear, logical and coherent answer, with no significant redundancy. The student understands the process and links this to reasons for clinical trials.

Level 2 (3–4 marks):
A partial answer with errors and ineffective reasoning or linkage.

Level 1 (1–2 marks):
One or two relevant points but little linkage of points or logical reasoning.

0 marks:
No relevant content.

Indicative content

- pre-clinical trials of the new drug on cells / tissues / live animals
- to test toxicity, dosage and efficacy
- clinical trials / test on healthy volunteers and Ebola patients at very low doses
- so that you can monitor for safety / side effects
- and only then do trials to find the optimum dosage and test for efficacy
- double blind trial / use of placebo
- which does not contain the new drug
- random allocation of Ebola patients to groups
- so no one knows who has placebo / the new drug
- peer review of data
- to help prevent false claims

6

[8]

4

(a) stomach and pancreas correctly labelled

1

(b) bacteria not killed (by stomach acid / HCl) and so they damage mucus lining

1

so <u>acid / HCl</u> damages stomach tissue / causes an ulcer

allow bacteria infect stomach tissue

1

(c) if the cancer is malignant

1

(cancer) cells can spread to other organs

1

via the blood forming a secondary tumour

do not award marking points 2 or 3 without marking point 1

1

(d) add Biuret reagent to food sample

allow sodium / potassium hydroxide (solution) + copper sulfate(solution)

1

mauve / purple colour shows protein present

1

(e) damaged villi reduce surface area for absorption (of food molecules)

1

(therefore) fewer amino acids and glucose absorbed

1

with less glucose transfer of energy from respiration is reduced

1

and fewer amino acids available to build new proteins

1

[12]

5

(a) vector

1

(b) any **three** from:

- destroy the snails
- isolate infected dogs
- treat infected dogs

allow vaccination

- educate owners about picking up dog faeces

3

(c) stop mosquitoes breeding

allow correct description

1

use mosquito nets

allow use of insect repellent

1

[6]

6

(a) 55%

***2** marks for correct answer alone*

accept 54 − 56

*5.5 / 10 × 100 alone gains **1** mark*

2

(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

3

(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.

6

[11]

7 (a) (i) 64

1

(ii) 36

allow e.c.f from (i) i.e. 100 − answer given in (a)(i)

1

(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.

1

(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

1

(c) having a high cholesterol level

1

(d) (i) antibodies

1

(ii) antibiotics

1

[7]

8 (a) leprosy

allow bone / blood cancer

ignore cancer

1

(b) (i) 6 / six

1

(ii) from 1120 to 5600

allow from 5600 to 1120

allow 4480 (alone)

1

(c) any **one** from:

ignore side effects, eg allergies

ignore safety / harm unqualified

- (test for) toxicity

  allow poisonous
- (test for) dosage

  allow idea of amount
- (test for) efficacy.

  allow to see if it works

  allow to check for interaction with other drugs

1

(d) (i) any **two** from:

ignore reference to cost / addiction

- more people take / use legal / non-prescribed drugs
- legal / non-prescribed drugs are (more) readily available
- alcohol causes liver / brain damage

  or

  tobacco causes cancer.

allow harmful effects of other named legal non-prescribed drugs

2

(ii) addiction / dependency

allow withdrawal or examples of symptoms of withdrawal (if attempting to stop)

1

[7]

9 (a) microorganism / bacteria / virus / fungus that causes (infectious) disease

1

(b) reduce / stop use of (current) antibiotics

1

(reduce / stop use) for non-serious / mild / viral infections

allow ensure course is completed

allow use of variety of antibiotics

1

(c) (i) 40 °C

1

(ii) any **one** from:

- microorganisms grow / reproduce / work / act faster
- results / product acquired sooner

1

[5]

10 (a) any **two** from:

- only one 'chromosome'
  allow one strand of DNA
- circular
  allow loop
- may have plasmids
- not in a nucleus / no nucleus

2

(b) (i) any **one** from:

- London is much higher
  or converse
- more variable / wider range
  allow 'on average it is 5 / 6 times greater'

1

(ii) increases
Included figures must be correct

1

(iii) overall slight increase
accept 'doesn't change much'

1

variable / goes up and down

1

(c) (i) both axes correctly labelled

x = Year

y = Number of cases

1

correct points
*all correct = **2** marks*
*1-2 errors = **1** mark*
*> 2 errors = **0** marks*

2

suitable line of best fit

accept straight line or smooth curve

1

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

1

(d) provides immunity / protection (to TB)

ignore 'stops people catching it'

ignore 'resistance'

1

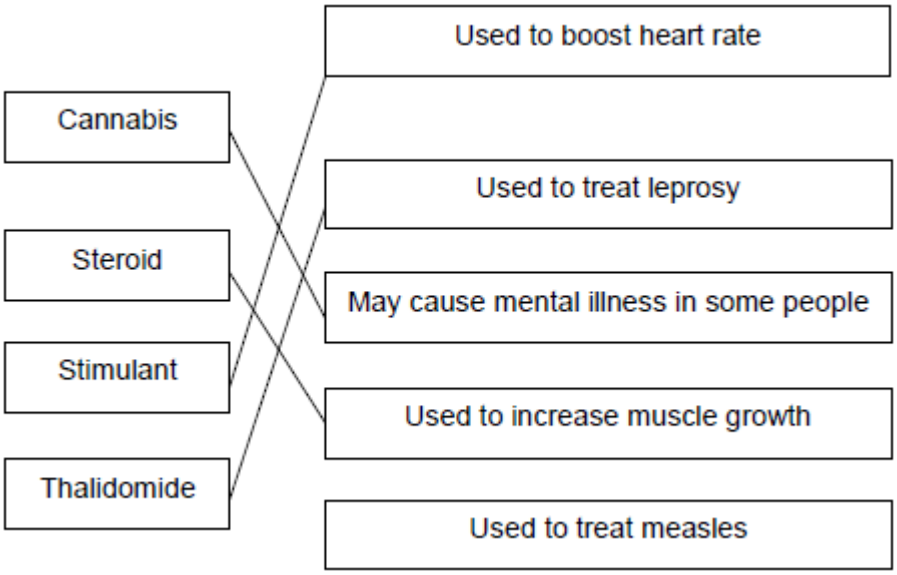
prevents TB <u>spreading</u>

accept ref to herd immunity

1

[13]

11 (a)



extra line from any drug cancels that mark

4

(b) (i) any **one** from:

- (live) animals

  accept named examples, eg mice

  ignore people / volunteers
- cells
- tissues

  *do **not** allow plants*

1

(ii) to check that the drug works

1

to find the best dose to use

1

(iii) only scientists at the drug company

1

(c) (i) 420

1

(ii) statin(s)

1

(iii) any **one** from:

- side effects
  allow cost
- other medication
  allow patient choice
- other (medical) conditions
  *allow family history **or** age*

1

[11]

12 (a) mumps

in either order rubella / German measles

both needed for the mark

ignore measles unqualified

1

(b) (i) 80(.0)

*allow **1** mark for* $\frac{504}{630}$ ***or** 0.8*

2

(ii) less chance of epidemic / pandemic

or

less chance of spread of disease / measles / mumps / rubella

allow idea of herd immunity (increased protection for those who are not vaccinated)

*ignore less chance of getting the disease **or** to eradicate the disease*

1

(c) (i) dead / inactive pathogens / viruses / bacteria

allow antigens / proteins from pathogens / viruses / bacteria

ignore microorganisms

1

(ii) white blood cells produce <u>antibodies</u>

1

antibodies produced rapidly (on re-infection) **or** response rapid (on re-infection)

allow ecf if antibodies incorrectly identified in first marking point

1

these antibodies kill pathogens / viruses / bacteria

*do **not** accept idea that original antibodies remain in blood and kill pathogens*

1

(d) (i) antibiotics don't kill viruses

allow antibiotics only kill bacteria

1

(because measles) virus / pathogen lives inside cells

*allow antibiotics do not work inside cells **or** killing virus / pathogen would kill / damage cell*

1

(ii) (bacteria / pathogens) develop resistance (to antibiotic)

ignore reference to immunity

ignore viruses develop resistance

1

[11]

13 (a) pathogens

1

(b) (i) A disease affecting people in many countries

1

(ii) birds fly / migrate

accept converse

OR

human contact with birds more likely

birds not contained / difficult to control movement

OR

there are more birds (than pigs)

1

(c) (i) antibiotics (only) kill bacteria

ignore flu is caused by a virus unqualified

OR

antibiotics don't kill viruses

ignore virus resistant / immune

1

(ii) painkillers

accept any correct named painkiller, eg aspirin or paracetamol

allow antivirals / Tamiflu

ignore medicine / tablets

1

(iii) resistant

1

bacteria

1

in this order

[7]

14 (a) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) 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 brief description of at least one of the stages (pre-inoculation, inoculation, post-inoculation).

Level 2 (3-4 marks)
There is a simple description of at least two stages and an explanation of at least one of them.

Level 3 (5-6 marks)
There is a clear description of all three stages and an explanation of at least two of them.

Examples of Biology points made in the response:

Pre-inoculation

- Petri dish and agar sterilised before use
- to kill unwanted bacteria
- inoculating loop passed through flame / sterile swab
- to sterilise / kill (other) bacteria

Inoculation

- loop/swab used to spread/streak bacterium onto agar

Allow other correct methods, eg bacterial lawns

- lid of Petri dish opened as little as possible
- to prevent microbes from air entering

Post-inoculation

- sealed with tape
- to prevent microbes from air entering
- incubate
- to allow growth of bacteria

6

(b) (i) bacteria killed / destroyed

ignore fights / attacks / stops growth / got rid of

1

(ii) *Might be correct*

largest area / space where no bacteria are growing

allow most bacteria killed

1

Might not be correct

(need more evidence as) D may be harmful to people / animals / surfaces

ignore ref to cost / dangerous or harmful unqualified

1

or may work differently with different bacteria

or disinfectants may be different concentrations

ignore different amounts of disinfectant unless reference to different drop size

or may not last as long

ignore take longer to work

allow reference to anomalous result or not repeated

[9]

15 (a) (i) any **one** from:

- (produce) toxins / poisons
- (cause) damage to cells

kill / destroy cells

allow kills white blood cells

1

(ii) produce antitoxins

1

engulf / ingest / digest pathogens / viruses / bacteria / microorganisms

accept phagocytosis or description

ignore eat / consume / absorb for engulf

ignore references to memory cells

1

(b) (i) dead / inactive / weakened

accept idea of antigen / protein

1

(measles) pathogen / virus

ignore bacteria

1

(ii) (after infection)

accept converse if clearly referring to before vaccination

1

rise begins sooner / less lag time

steeper / faster rise (in number)

1

longer lasting **or** doesn't drop so quickly

idea of staying high for longer

ignore reference to higher starting point

1

(iii) antibodies are specific or needs different antibodies

*accept antigens are different **or** white blood cells do not recognise virus*

1

(c) reduces <u>spread</u> of infection / less likely to get an epidemic

accept idea of eradicating measles

1

1

[10]

16 (a) antibodies

1

antitoxins

1

antibiotics

1

(b) any **two** from:

- measles
- mumps
- rubella / German measles

2

(c) less / low / no chance of getting named or all condition(s) if vaccinated

1

quantitative figure(s) eg 5 times less likely to get convulsions

1

1

[7]

17 (a) (i) viruses live inside cells

1

viruses inaccessible to antibiotic

allow drug / antibiotic (if used)

would (have to) kill cell

1

(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'

2

(b) (stimulate) antibody production

ignore antitoxin

1

(by) white cells

1

rapidly produce antibody on re-infection

ignore antibodies remain in blood

1

[7]

18 (a) 40 – 60 hours

1

(b) (i) decrease

1

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

1

(ii) oxygen after glucose

extra box ticked cancels 1 mark

1

oxygen less than glucose

1

(iii) respiration

1

[6]

19 (a) (i) decrease

1

rate of decrease slows

1

(ii) any **one** from:

- more use of disinfectant

  allow any reasonable increase in hygiene or sterilisation precautions
- more use of hand washing
- more careful / more often cleaning of patient facilities
- raised awareness / education about hygiene

1

Explanation:
stops / reduces the bacteria being transferred / spreading

1

(iii) 800 – 500 / 800 × 100 =

1

37.5 (%)

*correct answer with or without working gains **2** marks*

1

(iv) any **one** from:

- numbers quite low now so hard to reduce further
- was a big campaign / much publicity (in 2009) so more people already doing it
- hygiene / cleaning now good so hard to improve
- hospitals short of money so less staff to clean

1

(b) mutation occurred giving resistance (to methicillin)

*do **not** accept overuse caused mutation*

1

resistant bacteria not able to be treated / not killed

1

these bacteria multiplied / reproduced / spread quickly

1

[10]

20 (a) sporozoites (from mosquito saliva) divide / multiply / reproduce

ignore schizonts
*do **not** accept sexual reproduction*

1

become thousands / many (of merozoites)

1

merozoites released (from liver) into blood / red blood cells

1

(b) any **three** from:

*answer must include at least one pro **and** one con for full marks*

- reduces incidence of disease **= pro**
- success in mice indicates likely success in humans **= pro**

  accept stops people getting malaria
- but success in mice does not ensure success in humans **or** needs to be trialled in humans
  or need to check for side effects **= con**
- removal of genes should prevent parasite multiplying in liver **or** release of parasites into blood **= pro**

  allow you should not get malaria / the disease from these parasites
- the injected parasite stimulates antibody production **= pro**
- but still possible danger since living parasite injected into human **= con**
- possible liver damage **= con**

3

[6]

21 (a) (i) 25°C

1

(ii) pathogens

1

(b) **D**

1

more / most bacteria killed

accept biggest area / ring where no bacteria are growing

1

(c) viruses live inside cells

1

[5]

22 (a) (i) lower percentage (of women) who died

allow fewer (women) died

1

numerical reference to a pair of figures to show this

allow any difference in a pair of figures

1

(ii) doctors were not <u>transferring</u>

ignore reference to nurses

1

pathogens / bacteria / viruses / microorganisms / microbes

allow fungi

ignore disease / germs / infection

1

(b) any **three** from:

- lower percentage of patients died (when doctors washed hands or in ward A)

  allow fewer for lower percentage
- large decrease or reference to proportional decrease

  ignore raw data
- little / no difference / similar to ward B
- continued drop (in ward A)

3

(c) any **two** from:

- better understanding / knowledge <u>of immunity</u>
  accept ref to immunisation / vaccination
- better / new drugs
  accept examples, e.g. antibiotics / penicillin (discovered)
  allow better / new medicines
- sterilisation of equipment **or** isolation of patients **or** some infectious diseases wiped out **or** earlier identification / treatment of infections
  ignore references to general hygiene

2

[9]

23 (a) (i) addictive

allow addicting / addict / addicted / addiction or similar
allow phonetic spelling
*do **not** accept / additive / addition*

1

(ii) junction / gap / space between neurones

allow nerve cells / nerves for neurones
allow idea where neurones / nerve cells / nerves meet / join

1

(b) (i) tablet with no drug

accept answers that convey this idea eg fake / dummy / sugar pill
allow injection with no drug
ignore drugs that don't work.

1

(ii) for comparison

accept to see if drug / it works
*allow to see psychological effect **or** make sure, it is not all in the mind*
allow as a control
ignore 'to make test fair / unbiased'

1

(iii) Neither doctors nor volunteers

1

(iv) any **two** from:

- age (range)
- sex / gender (mix)
- previous smoking habits **or** eg number smoked (before trial) **or** length of time smoked
- number in the group
- other drugs being taken **or** general health **or** height / weight / BMI / lifestyle / fitness

ignore factors already controlled

*ignore reference to all smokers **or** all want to give up*

2

(c) higher percentage / number of smokers who had stopped smoking (than Drug B)

answers must refer to data and be comparative

allow best results / most effective

ignore best drug unqualified

ignore references to 12 weeks / 1 year

1

[8]

24 (a) both lead to reduction / fall (in measles cases)

can be implied

1

measles vaccine caused a big drop **or** correct use of figures

1

MMR wipes out measles **or** drops to (almost) zero **or** doesn't fall as much as measles vaccine **or** correct use of figures.

1

(b) mump(s)

1

rubella / german measles

either order

allow phonetic spelling

1

(c) white blood cells

allow lymphocytes / leucocytes

ignore memory cells

1

(wbc) produce antibodies

ignore antitoxins / antigens / antibiotics / engulfing

1

in future / if re-infected antibody production rapid / fast(er) / quick(er)

allow ecf from antitoxins / antigens / antibiotics

ignore engulfing

ignore reference to specificity

1

[8]

25 (a) (i) any **one** from:

- cells
- tissues
- (live) animals / named

allow mammals

1

(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

3

(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

6

[10]

26 (a) hearsay

1

(b) (volunteers with feet in) <u>empty</u> bowls

accept bowl with no (iced) water

*do **not** accept mention of bowl with iced water*

1

(c) any **three** from:

ignore control variables, eg age, gender

- only some of those whose feet were in cold water caught colds
- some controls caught colds
- only feet were cold in experimental group

  allow (control) not wrapped up warm
- only kept feet in cold water for 20 minutes
- insufficient evidence for 'proof' / only showed increased risk

  allow small sample size
- don't know activities of individuals before / after the investigation (eg exposure to cold virus) / reference to immune system

  allow investigation done in 'cold season'

3

[5]

27 (a) (i) kills / gets rid of / reduces <u>methane</u> bacteria

allow kills / gets rid of / reduces <u>bad</u> bacteria

ignore acts like antibiotic

1

(ii) less food converted to methane

allow can keep more cattle without further environmental damage

ignore energy

1

more growth / meat / muscle / milk produced / more profit / fatter animals

ignore references to bacteria and disease

1

(b) absorbs energy / heat radiated by Earth

allow absorbs / traps energy / heat / from Earth

*do **not** allow absorbs energy / heat from Sun*

1

some energy / heat reradiated

ignore reflected

*do **not** allow reradiates energy / heat from Sun*

1

leading to global warming / enhanced greenhouse effect

accept effects of global warming eg melting ice caps

accept methane is a greenhouse gas

ignore references to ozone

1

[6]

28 (a) dead or inactive or weak form of pathogen / bacterium / virus / microorganism introduced

ignore disease / germ

1

(stimulates) white cells / lymphocytes / leucocytes

accept B and T cells

ignore phagocytes

1

to produce antibodies

ignore antitoxins / antigens

1

antibodies made quickly on re-infection / idea of memory cells

ignore already has antibodies

ignore 'body remembers'

1

(b) (i) alters / causes chemical processes / body chemistry

ignore craving / withdrawal symptoms

1

(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

2

[7]

29 (a) don't kill pathogens / bacteria / viruses / microbes / microorganisms

allow don't contain antibiotics

ignore antibodies / attack / fight

allow only treat symptoms / pain

ignore kill disease / germs

1

(b) any **two** from:

- age
- gender
- extent / severity of pain
  or how long had pain before trial
- type of pain / illness / site of pain

  *accept 'the pain' for **1** mark, if neither extent or type given*

  ignore pain threshold
- (body) mass / weight / height

  allow body size / physique
- other medical issues / drugs taken / health / fitness
- ethnicity

2

(c) (i) 75

ignore calculations / %

1

(ii) faster pain relief / decrease

allow pain relief sooner
***or** it works quicker*

***or** more pain relief at start / in first 1 / 1$\frac{3}{4}$ hours*

1

(iii) decrease of pain higher / more

ignore more effective unless qualified by time > 1$\frac{3}{4}$ hours
allow effect lasts longer

1

decrease of pain is longer lasting

1

(d) any **three** from:

ignore yes or no

(Yes because)

- rapid pain relief (from A)
- long lasting pain relief (from B)
- and it costs less
- the sum of the pain relief (from A + B) is greater (than X)

(No because)

- drug X gives more pain relief
- (A + B / they) might interact with each other
- could result in overdose
- could be more / new side effects

if neither points gained
allow (more) dangerous

3

[10]

30 (a) (i) dead / inactive / weakened

allow antigen / protein
ignore ref to other components
ignore small amount

1

pathogen / bacterium / virus / microorganism

ignore germs / disease

1

(ii) *antigen / antibiotic instead of antibody = max 2*

white blood cells produce / release antibodies

accept lymphocytes / leucocytes / memory cells produce antibodies
*do **not** accept phagocytes*

1

antibodies produced quickly

1

(these) antibodies destroy the pathogen

allow kill
*do **not** accept antibodies engulf pathogens*

1

(b) (i) (live) bacteria still in body

ignore numbers

1

would reproduce

ignore mutation / growth

1

(ii) antibiotics / treatment ineffective **or** resistant pathogens survive

accept resistant out compete non-resistant

1

these reproduce

1

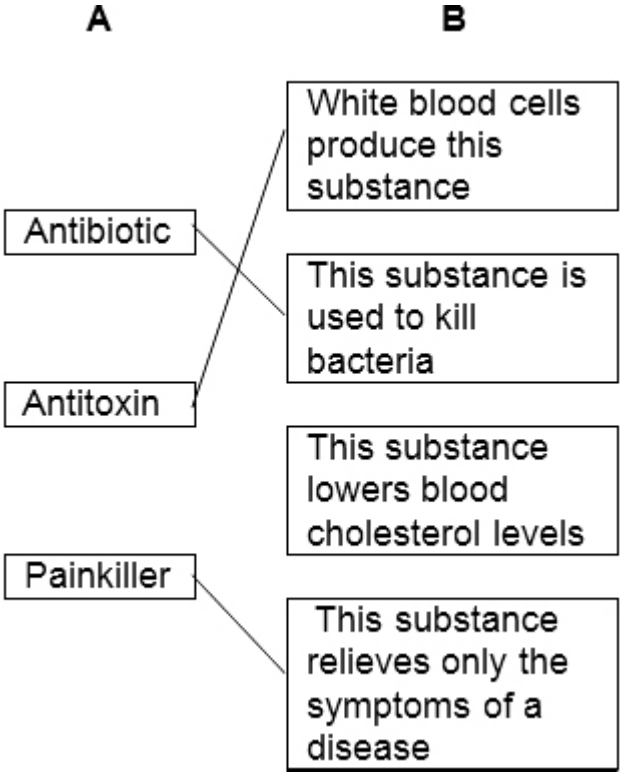
population of resistant pathogens increases

allow (resistant pathogens reproduce) rapidly

1

[10]

31 (a)



1 *mark for each correct line*

mark each line from left hand box

two lines from left hand box cancels mark for that box

3

(b) inactive

allow weak / dead / un-living / safe

1

rubella

apply list principle, but ignore measles and mumps

1

[5]

32 (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

2

(b) (i) $\frac{1}{4}$ **or** 0.25 **or** 25%

*correct answer gains **2** marks*
*if answer incorrect, evidence of 1500 ÷ 6000 gains **1** mark*
*25 without % gains **1** mark*

2

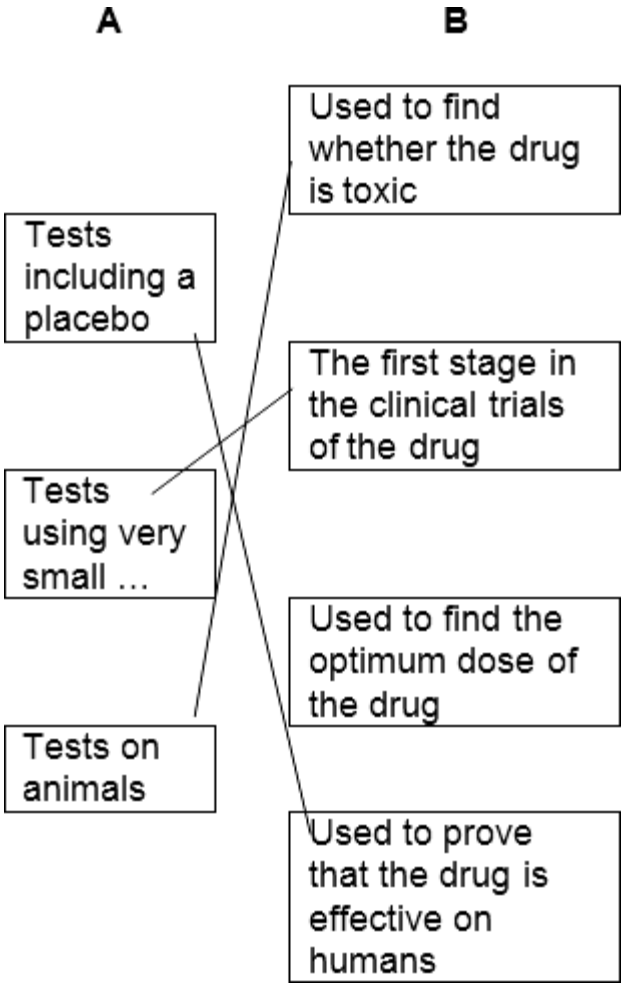
(ii) majority / most / high proportion of people in trial lost mass / weight

ignore good results / it worked

1

[5]

33 (a)



1 *mark for each correct line*

mark each line from left hand box

two lines from left hand box cancels mark for that box

3

(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

3

[6]

34 (a) 18.06 / 18 / 18.1

*correct answer gains **2** marks*
if answer incorrect evidence of
(4131 - 3499) ÷ 3499 × 100
***or** 632 ÷ 3499 × 100*
***or** ((4131 ÷ 3499) × 100) - 100*
***or** 0.18*
*gains **1** mark*

2

(b) antibiotics kill non-resistant strain
or resistant strain bacteria survive

accept resistant strain the successful competitor
*do **not** accept intentional adaptation*
ignore strongest / fittest survive
ignore mutation
ignore people do not finish antibiotic course

1

resistant strain bacteria reproduce
or resistant strain bacteria pass on genes

1

population of resistant strain increases **or** proportion of resistant bacteria increases

allow high numbers of resistant bacteria

or

people more <u>likely</u> to be infected by resistant strain (than non-resistant strain)

1

[5]

35

(a) cell division / bacterium divides / multiplies / reproduces

allow asexual / mitosis

ignore growth

1

(b) 18

1

18 000 / 18 × 10^3 / 1.8 × 10^4

*do **not** accept 1.8 / 1.8 ^{04} / 1.8^4*

allow ecf from wrong count

1

(c) to kill / destroy other microorganisms / named type
or to prevent contamination

ignore germs / viruses

1

to prevent other microorganisms affecting the results
or other microorganisms would be counted

allow to give accurate / reliable results

1

(d) prevent growth of pathogens / disease-causing microorganisms / dangerous microorganisms

*do **not** accept microorganisms <u>become</u> pathogenic*

ignore germs / viruses

ignore general safety / biohazards / harmful products produced by bacteria

1

(e) to improve the reliability of the investigation / check for anomalies

*do **not** accept accuracy / precision / fairness / validity*

ignore averages / repeatability / reproducibility

1

[7]

36 (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]

37 (a) any **two** from:

- (high) CRP / protein
- (no) heart condition

  allow health
- (not high) LDL
- over 50 / age
- number of tablets (each day)

  ignore time

  ignore placebo / rosuvastatin

  ignore number of people

2

(b) any **one** from:

- tablet with no drug
  allow fake (pill) / dummy (pill) / sugar / chalk (pill)
- tablet that has no effect
  allow drug that has no effect
- tablet without chemicals
  ignore vitamin / mineral pill
- tablet that people thought contained statin **or** reference to psychological effect
  ignore control / different statin

1

(c) 17802 / large number of people **or** enough people
ignore control group / fair test / control variables
ignore time / repeats

1

(d) any **one** from:
ignore cost

- placebo group at risk of heart attack **or** to allow statin to be given to everyone
- statin group 54% less likely to get heart attack **or** showed that statin worked **or** showed trial (very) successful
  ignore reliable
- sufficient information gained / results conclusive
  ignore got results early
- unethical / unfair to carry on trial

1

(e) to avoid bias **or** show impartiality **or** show results independent
allow manufacturers could cheat
ignore reliability
ignore could be sued / blamed if trial went wrong
ignore manufacturer would know which group got statin / placebo

1

(f) any **two** from:

- reduction in LDL

  *allow improves LDL:HDL balance **or** LDL and HDL concentrations equal*

  ignore less cholesterol

  ignore more HDL

  *do **not** accept less HDL*

- reduction in (saturated) fats

- reduces deposition of fat / cholesterol / LDL in walls of blood vessels
  or
  blood vessels less likely to be blocked with fat / cholesterol / LDL

2

[8]

38 (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]

39 (a) measles

1

mumps

1

rubella

1

(b) antibodies

1

(c) (i) any **two** from:

- fell
- then rose
- any reasonable amplification eg until 2004 / to 80%
- flattens off (between 1999–2000)

2

(ii) eg fear of side effects

or

cost of vaccine

or

lack of vaccine

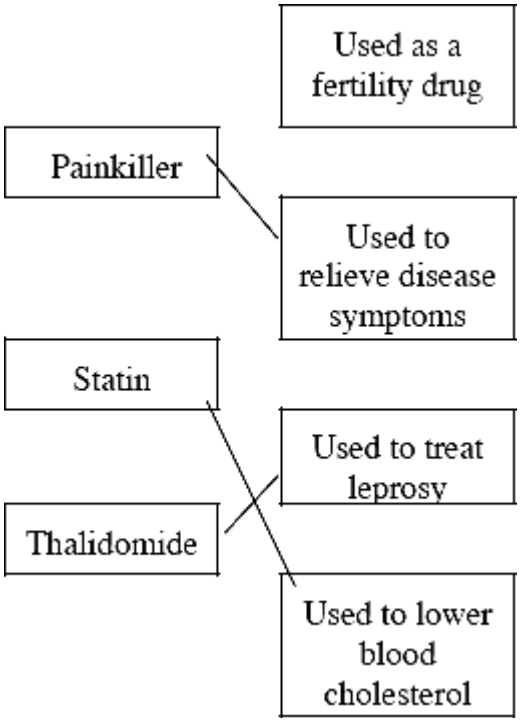
or

complacency / disease less common

1

[7]

40 (a)



*all three correct = **3** marks*
*two correct = **2** marks*
*one correct = **1** mark*
extra line from a statement cancels the mark

3

(b) (i) 8

1

(ii) 3210

1

(c) (i) if it is toxic

1

(ii) if it has side effects

1

[7]

41 (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]

42 (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]

43 (a) (i) inoculating loop

1

(ii) V

1

W

either order

1

(iii) Z

1

(b) carbohydrates

1

[5]

44 (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 <u>side effects</u> 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]