AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.3.1 COMMUNICABLE DISEASES (PACK 2)

SCORE	PERCENTAGE
/217	%

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Q1.

(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]

Q2.

(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

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- 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

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- could be more / new side effects

  if neither points gained
  allow (more) dangerous

3

[10]

Q3.

(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

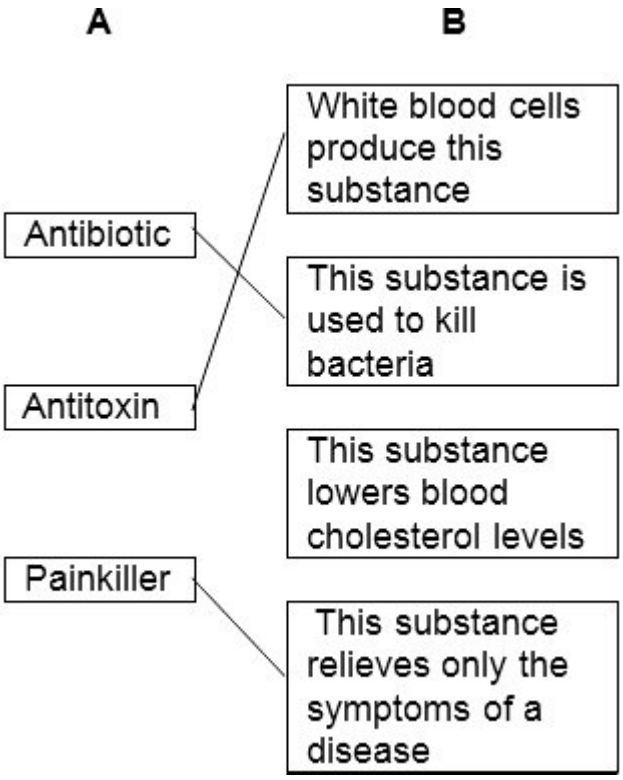
1

[10]

Q4.

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(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]

Q5.

(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

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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

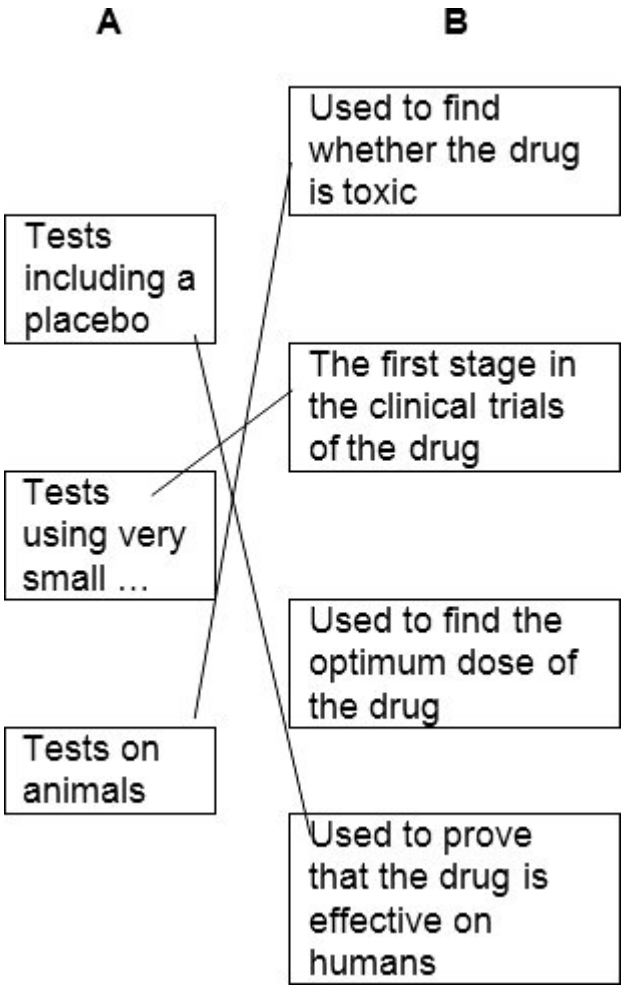
ignore good results / it worked

1

[5]

Q6.

(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

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- 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]

Q7.

(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 likely to be infected by resistant strain (than non-resistant strain)

1

[5]

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Q8.

(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]

Q9.

(a) <u>kills</u> / 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

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allow not effective
ignore immunity

1

to antibiotics

1

[5]

Q10.

(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

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- 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]

Q11.

(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

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- reasonable reference to memory cells **or** rapid production of antibodies upon re-infection

1

[4]

Q12.

(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

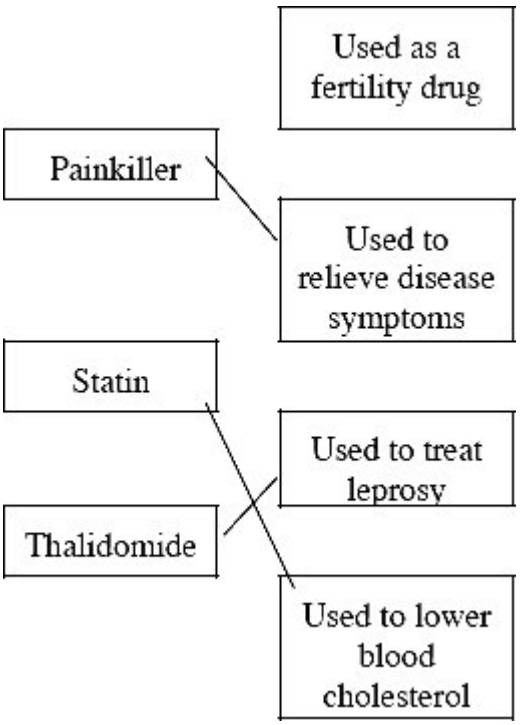
1

[7]

Q13.

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(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]

Q14.

(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

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- 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]

Q15.

(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]

Q16.

(a) (i) inoculating loop

1

(ii) V

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1

W

either order

1

(iii) Z

1

(b) carbohydrates

1

[5]

Q17.

(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

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- 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]

Q18.

(a) antibodies
allow antitoxins / memory cells
*do **not** allow antigens*

1

immune
ignore protection
allow resistant

1

(b) (i) fell

1

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numerical qualification to zero / nothing / by 100%

allow stopped in 1995

1

(ii) (no)

ignore circle

1

% vaccination fell **or** when no vaccination

but autism numbers did not fall / stayed high / increased

or

'(yes) might support it if time lag between vaccination and autism symptoms' / 'time lag for diagnosis' (1)

6 year time lag quantified (1)

1

[6]

Q19.

(a) any **two** from:

- sterilise / kill microorganisms
  ignore 'cleaning' / 'disinfect'
  ignore 'germs'
- method of sterilisation eg apparatus / media sterilised in oven / autoclave
  allow pressure cooker / boiling water
- pass flask mouth / pipette tip / loop / test tube mouth through flame
- work near a flame
- minimise opening of flask / test tube **or** hold non-vertical
  *allow idea of sealing / covering **or** prevent entry of air*

2

(b) any **two** from:

- temperature
  ignore references to time / type of bacterium
- concentration / amount of nutrients / ions
- type of nutrient
- volume / amount of solution
- amount of bacteria added
- agitation **or** amount of oxygen

2

(c) (i) 7.5

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accept in range 7.4 – 7.6

1

(ii) use more pH values around / close to pH 7.5 / between 7 and 8

1

[6]

Q20.

(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

[6]

Q21.

(a) any **two** from

- live inside / infect body cells
- difficult for drugs to enter (body) cells / drug would kill (body) cell
- antibiotics ineffective against viruses
- viruses mutate **frequently**

2

(b) (i) 420

*correct answer with **or** without working*
*if answer incorrect evidence of 'number of deaths' × 7 **or** 60 seen gains **1** mark*
ignore 6 000 000

2

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(ii) any **three** from:

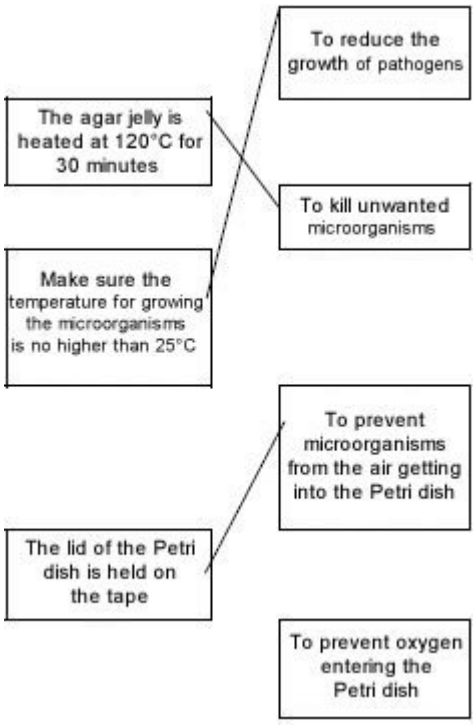
- virus / flu mutates
- people no longer / not immune
  ignore resistance
- white blood cells / memory cells / immune system do not recognise virus
- relevant reference to antibodies / antigens
- current vaccine ineffective **or** no vaccine available then **or** takes time to develop new vaccine
  allow no tamiflu / anti-viral drugs
- conditions less hygienic / lack of hygiene
- people in poor health (following world wars)
  allow people had 'weak' immune system

3

[7]

Q22.

(a) **Liast A – Action** **List B – Effect**



***1** mark per correct line*
*each extra line cancels **1** mark*

3

(b) (i) dish 2 has (colonies of) microorganisms / bacteria / (but there are none in dish 1)

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allow fungi / pathogens / microbes / germs
allow more microorganisms in dish 2

1

(ii) untreated milk contains <u>living</u> microorganisms

or

microorganisms killed by UHT

or

no <u>living</u> microorganisms in UHT milk

ignore microorganisms enter from the air

1

(iii) dish 3 was not opened

*do **not** allow no growth of microorganisms because of lack of air / oxygen*

or

it was sterilised

ignore microorganisms cannot enter from the air

or

nothing / no milk was added

1

[6]

Q23.

(a) (i) lives inside cells

1

(ii) inactive

1

(iii) antibodies

1

(b) (i) 1950

1

(ii) 8 (years)

1

(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

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1

[6]

Q24.

(a) any **three** from:

- vaccine is inactive / dead form of (pathogen)
  allow antigens
- stimulates antibody production
- stimulates antitoxin production
- by white cells
- antibodies kill (pathogen)
- antitoxins neutralise poisons
- antibodies quickly produced on reinfection
  ignore antibodies remain in blood
- reference to ingestion by white cells

3

(b) (i) (no)

any **two** from

- sample size small / only 12
- conclusion based on hearsay from parents
- only 8 parents linked autism to MMR
- no control used

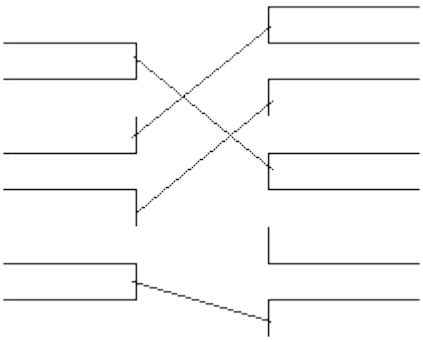
2

(ii) (yes)
being paid by parents / lawyers

1

[6]

Q25.



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1 mark for each line
extra line from List A Action cancels the mark

[4]

Q26.

(a) (i) antibiotic or named antibiotic

ignore antibodies
accept antiseptic
*do **not** accept disinfectant*

1

(ii) painkillers

accept named painkillers eg aspirin

1

(b) (i) 5.5 / 5 ½ weeks

1

(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

3

(iii) (no)

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

1

[7]

Q27.

(a) (bacteria) produce toxins / poisons

1

(viruses) damage / kills cells **or** toxins released from cell

1

(b) any **two** from:

- viruses live inside cells
- viruses inaccessible to drug
- drug would damage body cells / tissue

2

(c) any **four** from:

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- overuse of antibiotics
- bacteria mutate
  *do **not** allow antibiotic causes mutation*
- antibiotics kill non-resistant strains **or** idea of selection
- reduced competition
- resistant bacteria reproduce

4

[8]

Q28.

(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 / all condition(s) if vaccinated

1

quantitative figure(s) e.g. 5 times less likely to get convulsions
must be comparative

1

(d) enzymes

1

genes

1

[9]

Q29.

(a) any **two** from:
virus is neutral

- resistant to (most) antibiotics
- contagious **or** easily passed on **or** reference to open wounds
- patients ill therefore less able to combat disease

2

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(b) (i) chloride of lime / hand washing killed bacteria (picked up from corpses)

allow disease / germs / infection / disinfectants

1

(ii) people to wash hands after contact with patient

1

so bacteria / pathogen / MRSA not transferred to other patient

1

[5]

Q30.

(a) (i) 56

accept 54 – 58

1

(ii) increased

1

reasonable qualification eg slowly then more quickly

or

to 174 / 176

or

by 138 / 140

1

(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

2

[5]

Q31.

(a) (i) viruses live inside cells

1

viruses inaccessible to antibiotic

allow drug / antibiotic (if used) would (have to) kill cell

1

(ii) mutation

ignore mutation caused by antibiotic

1

natural selection **or** no longer recognised by antibiotics

accept description of natural selection

1

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(b) (stimulate) antibody production

ignore antitoxin

1

(by) white cells

1

rapidly produce antibody on re-infection

ignore antibodies remain in blood

1

[7]

Q32.

(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*

1

(b) fewer died

1

indication of reduced number **or** proportion

e.g. 3000→ 600

down by 2400

20% of previous deaths

1

[3]

Q33.

(i) kills / destroys bacteria **or**
prevents growth of bacteria

*do **not** allow germs*

*do **not** allow fights or gets rid of*

1

(ii) any **two** from:

bacteria may be resistant / immune (treatment futile)
or bacteria would not be killed

accept descriptions from table
accept "fights" here

do not accept people resistant

may select for resistant type

may cause increased incidence of resistance or Penicillin less effective in future

sore throat might be due to a virus – Penicillin would not work

2

[3]

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Q34.

(a) measles

ignore mumps

1

rubella

accept German measles

1

(b) viruses are 'dead'

accept other viral treatments
accept 'non-virulent'
mild' must be qualified
*do **not** accept 'small dose'*

1

(c) *The answer to this question requires good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme*.

Maximum of 4 marks if ideas not well expressed

any **five** from:

contains antigens or proteins

accept reference to immunological memory or memory cells'

white cells (accept lymphocytes)

do not accept phagocytes

idea of specificity in antibodies or antigens

antibody <u>production</u>

ignore engulfing

antigens destroyed / virus destroyed

<u>rapid</u> antibody production if infected

max 5

(d) antibiotics do not kill / affect viruses

1

[9]

Q35.

(a) (i) diagram shows extensions of intact cell membrane around viruses

1

(ii) antibodies

allow enzymes re (ii)
allow interferon
ignore antitoxins / proteins

1

(b) <u>virus</u> is transferred

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1

(virus in) blood / body fluids – transfer (via needles)

1

[4]

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