**M1.**(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**

**[7]**

**M2.**          (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

**1**

**[6]**

**M3.**(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]**

**M4.**          (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 hours*

**1**

(iii)    decrease of pain higher / more

*ignore more effective unless qualified by time > 1 hoursallow 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]**

**M5.**          (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]***

***M6.****(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]***

***M7.****(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]***

***M8.****(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 production*

*ignore engulfing*

*antigens destroyed / virus destroyed*

*rapid antibody production if infected*

***max 5***

*(d)     antibiotics do not kill / affect viruses*

***1***

***[9]***

***M9.****(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]***

***M10.****(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]***

***M11.****(a)     live inside cells*

***1***

*inactive*

***1***

*antibodies*

***1***

*(b)     the percentage of children vaccinated fell to zero in 1995*

***1***

*but the number of children developing autism rose and fell
during the period when % vaccinations was falling*

***1***

*number of children developing autism peaked after MMR
vaccination had ceased*

***1***

*which suggests that something other than MMR vaccination
was causing autism*

***1***

***[7]***

***M12.****(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]**

**M13.**          (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]**

**M14.**          (a)     antibodies;

*if incorrect term used then penalise in (a) then regard as continuous error for rest of question*

**1**

(b)     antibodies remain (for several years)
**or** are not removed

*accept last a long time* ***or*** *not destroyed****or*** *continues to make antibodies****or*** *causes increased number of
antibodies* ***or*** *more antibodies****or*** *stays in body* ***or*** *person has
made own antibodies****o****r if memory cells named must
link to antibody production*

**1**

(c)     antibodies removed (from blood);

*accept destroyed* ***or****unable to make* ***or****replace antibodies* ***or****they are not human antibodies* ***or****person has not made own antibodies*

**1**

(d)     so more antibodies made;

*accept so enough antibodies made****or*** *so correct amount of antibodies
present* ***or*** *to keep antibodies high****or*** *so body keeps making
antibodies*

**1**

(e)     any **two** from

          already has tetanus bacteria in body;

*accept could boost infection* ***or*** *make it worse*

          would take too long **or**a long time for antibodies to be made;

*accept too slow forming antibodies****or*** *cannot form correct amount of
antibodies*

          disease would have effect before
antibodies made;

*accept antibodies are specific****or*** *will work for one disease but not another*

**2 max**

(f)      injection of ready made antibodies;

*accept does not have to wait for antibody formation* ***or*** *has large amount of antibodies quickly****or*** *has enough antibodies quickly****or*** *antibodies start working straight away*

**1**

**[7]**

**M15.**          (a)     shape of antibody is not complementary;

*accept shapes of antibody and antigen do not match or antibody does not correspond to antigen* ***Y******or*** *is not the same shape as antigen* ***Y******or*** *antibody different shape*

**1**

so unable to attach or join to antigen **Y**

*accept they do not fit*

**1**

(b)     (i)      antibodies in blood or in skin or in body;

*accept already have the antibodies*

**1**

         react with (injected) antigens or bacteria;

*accept skin affected by antigen-antibody complex* ***or*** *blood vessels in skin enlarge* ***or*** *dilate*

*do* ***not*** *accept attack instead of react*

**1**

(ii)     any **three** from

bacteria weak so do not cause disease

*accept not harmful*

*do* ***not*** *accept bacteria are dead*

cause antibody production;

memory cells remain;

*accept a suitable description*

so body can quickly produce more antibodies in a real infection;

*accept antibodies remain in blood* ***or*** *in body*

**3**

**[7]**

**M16.**         (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]**

**M17.**(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]**