

2802 Human Health and Disease

June 2005

Mark Scheme

ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ($\frac{1}{2}$) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.

x = incorrect response (errors may also be underlined)
^ = omission mark
bod = benefit of the doubt (where professional judgement has been used)
ecf = error carried forward (in consequential marking)
con = contradiction (in cases where candidates contradict themselves in the same response)
sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Examiners will be expected to use their professional judgment in marking answers that contain more than the number required. Advice about specific cases will be given at the standardisation meeting.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

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|---|---------------|---------------------|--|
| Abbreviations, annotations and conventions used in the Mark Scheme | / | = | alternative and acceptable answers for the same marking point |
| | ; | = | separates marking points |
| | NOT | = | answers which are not worthy of credit |
| | R | = | reject |
| | () | = | words which are not essential to gain credit |
| | <u> </u> | = | (underlining) key words which must be used to gain credit |
| | ecf | = | error carried forward |
| | AW | = | alternative wording |
| A | = | accept | |
| ora | = | or reverse argument | |

| Question | Expected Answers | Marks |
|----------|---|-------|
| 1 (a) | <i>Vibrio cholerae</i> / <i>V. cholerae</i> / <i>Vibrio</i> ; | 1 |
| (b) | pass out of (infected) person in faeces / AW ; contaminate water supply / water-borne ; water used to irrigate crops ; A idea of contamination faeces / AW, used to fertilise crops ; infected people handle, food / cooking utensils (without washing hands) ; infection by mouth / drink contaminated water / eat contaminated food ; | max 3 |
| (c) | lack of, education in / knowledge of, hygiene ; poorer sanitation ; lack of sewage treatment ; raw sewage used to, irrigate / fertilise, crops ; lack of water treatment / AW ; unable to control outbreaks (due to lack of rehydration therapy) ; AVP ; e.g. qualified economic statement AVP ; ref to natural disasters ref to, civil unrest / migrants | max 3 |

[Total: 7]

| Question | Expected Answers | Marks |
|----------|--|--------------|
| 2 (a) | nicotine ; | 1 |
| (b) | any two from carbon monoxide / CO ; binds to haemoglobin / forms carboxyhaemoglobin ; Hb has greater affinity for CO / CO binds more strongly than oxygen ; A irreversibly reduces oxygen carrying ability / amount of oxygen that can be carried ; 3 max tar ; accumulates, in lung / on alveolar surface ; increases, diffusion barrier / thickness of barrier between air and blood / AW ; reduces rate of diffusion / gaseous exchange more difficult / AW ; causes cancer / carcinogenic ; paralyses / damages cilia ; R kills / destroys, cilia increases mucus production / AW ; increases chance of infection ; production of scar tissue ; reduces elasticity of the airway / (oxidants) increase activity of elastase (emphysema) ; 3 max carcinogen ; causes cancer ; changes DNA / mutation ; uncontrolled mitosis / no programmed cell death / no apoptosis ; tumour ; 3 max AVPs 2 x 3 max e.g. arsenic ; interferes with cytochromes in respiratory chain ; prevents ATP production ; replaces phosphate group in ATP ; formaldehyde / methanal ; cancer causing ; causes irritation ; allergic reaction ; benzpyrene ; adheres to surfaces ; cancer-causing ; cadmium ; irritation of membranes ; increased viscosity of mucous secretions ; mucus collects in lungs ; 3 max A nicotine if not given in (a) | 5 max |

- (c) (i) % heavy smokers rises from, professional / gp 1, to, unskilled manual workers / gp 6 / AW ; **A** statements comparing groups 1 and 6

ref. to figures used as a comparison ;

2 max

- (ii) as % heavy smokers increases so does number of people suffering long-standing illness ;

the relative increase in smoking is far greater than the relative increase in long-standing illness / not a proportional increase / AW ;

use of figures to illustrate ;

e.g. smoking increases more than 6 fold while long-standing illness increases less than 2 fold
 smoking increases from 3% to 19% while long-standing illness increases from 290 to 420 (per 1000)

AVP ; e.g. ref. to anomalous point

2 max

- (iii) *qualified ref to*

medical services ;
 working environment ;
 living conditions ;
 income ;
 education (about diet / possible relief from long-term illness) ;
 diet ;
 work-related injury ;
 alcohol intake ;
 (work related) stress ;
 (aerobic) exercise ;

2 max

[Total: 12]

| Question | Expected Answers | Marks |
|----------|--|-------|
| 3 (a) | <p>1 genetic, testing / screening ;</p> <p>2 for inherited disease / AW ;</p> <p>3 (test to see if) individual is carrier ;</p> <p>4 premarital testing / predict if (potential) offspring may inherit the disease ;</p> <p>5 antenatal testing ;</p> <p>6 ref to termination ;</p> <p>7 embryo selection (to ensure embryo healthy) ; R selection of sex</p> <p>8 (test for genes that contribute to) diseases that develop later in life ;</p> <p>9 those with genes given, advice to limit effects / counselling ;</p> <p>10 faster / earlier, diagnosis ;</p> <p>11 develop more, effective / efficient, drugs (to combat disease) ;</p> <p>12 drugs have direct effect, on genes / protein made from specific gene code ;</p> <p>13 gene therapy / correct the base sequence of faulty gene ;</p> <p>14 economic implications / AW ;</p> <p>15 AVP ; e.g. ref. to method used / use of gene probes / biopsy</p> <p>16 AVP ; allows targeting of drug treatment</p> | 4 max |
| (b) | <p>anxiety about (future) health / may not want to know / AW ;</p> <p>many diseases we can test for have no treatments ;</p> <p>discrimination by employers ;</p> <p>discrimination by, insurance companies / banks ;</p> <p>reliability of tests in question ; A false, positive / negative, result</p> <p>example of disease given in context ;</p> <p>cost to, NHS / government ;</p> <p>rich people can benefit / poor will not benefit ;</p> <p>AVP ; ;e.g. moral issues associated with embryo selection</p> <p>eugenics</p> <p>parents feelings towards child</p> <p>presence of allele may not cause disease / ref to multifactorial diseases</p> <p>ref to storage of data and freedom of information / invasion of privacy /</p> <p>question of paternity</p> <p>R 'playing God' / cloning</p> | 4 max |

[Total: 8]

| Question | Expected Answers | Marks |
|----------|--|-------|
| 4 (a) | eating too much ; high, fat / sugar / carbohydrate / alcohol (in diet) ; energy intake greater than use ; insufficient exercise ; AVP ; e.g. genetic predisposition underactive thyroid | 2 max |
| (b) | decrease in % underweight ; decrease in % acceptable ; increase in % overweight ; large / great / dramatic / significant, increase in % obese ; use of figs to illustrate one change ; | 4 max |
| (c) | 1 high level of saturated fat in diet ; 2 animal fat / red meat / dairy products ; 3 high cholesterol (in blood / body) ; 4 lack of, vit E / antioxidants ; 5 high salt in diet ; 6 obesity linked to high blood pressure / hypertension ; 7 damage to artery, walls / endothelium ; 8 cholesterol transported in lipoproteins ; 9 cholesterol deposited <u>in artery walls</u> ; 10 in coronary arteries ; 11 atherosclerosis / atheroma ; 12 formation of, plaques / fatty streaks ; 13 hardening / loss of elasticity (of artery wall) ; 14 roughens lining / increases friction ; 15 clot formation / thrombosis / thrombus ; 16 narrows / restricts, lumen ; 17 reduced / restricted, blood flow / oxygen, to heart <u>muscle</u> ; 18 heart (muscle), under stress / works harder ; 19 angina / heart attack / myocardial infarction / heart failure / hypertrophy ; R CHD 20 AVP ; e.g. aneurism in aorta 21 AVP ; low density lipoproteins (LDL) associated with deposition high density lipoproteins (HDL) associated with less deposition | 7 max |
| | QWC – clear well organised using specialist terms ; | 1 |

[Total: 14]

| Question | Expected Answers | Marks |
|----------|---|-------|
| 5 (a) | 122 ; A if not in box | 1 |
| (b) (i) | (pulse rate) increases ; use of figures to demonstrate increase ; | 2 |
| (b) (ii) | increased respiration ; in muscles ; requires more, oxygen / glucose ; increased carbon dioxide production ; carbon dioxide removed in blood ; cardiac output must increase / AW ; lactate, produced / transported to liver ; A lactic acid | 3 max |
| (c) | D ; <i>max 3 for reasons</i> high resting pulse rate ; heart rate / pulse rate, goes higher than others / very high ; A pulse rate always high figures to demonstrate pulse rate point ; blood pressure higher at rest ; blood pressure, rises to higher than others / highest ; A blood pressure always higher use of figures to demonstrate blood pressure point ; | 4 max |
| (d) | fat more likely to, compress / constrict, blood vessels ; atherosclerosis more likely ; greater friction ; (therefore) blood pressure higher ; more weight means more work done (by muscles during exercise) ; more oxygen needed (by respiring tissues) / more CO ₂ needs to be removed ; | 2 max |

[Total: 12]

| Question | Expected Answers | Marks |
|----------|---|-------|
| 6 (a) | R ; | 1 |
| (b) | R / binding site / variable region, has specific, amino acid sequence / primary protein structure ; R / binding site / variable region, has specific <u>shape</u> ; complementary to / matching (part of), antigen A ; A lock and key idea | 2 max |
| (c) | 92/100 x 90 = 82.8 100 – 82.8 ; 17.2 ; A 17% | 2 |
| (d) | difficult to diagnose ; not all / enough, of population vaccinated ; A need 93-95% vaccination A ref to herd, vaccination / immunity poor response to vaccine / only 90-95% vaccinated people have protection ; ora boosters needed / difficult to trace those who need boosters ; ora migrants can (easily) bring measles into a community ; AVP ; e.g. length of time vaccination remains effective / ora AVP ; measles mutates more frequently / ora people less worried about measles so don't get vaccinated / ora concerns about link of MMR to, side effects / autism | 2 max |

[Total: 7]