

2802 Human Health and Disease

June 2004

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. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
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 A = accept () = words which are not essential to gain credit _____ = (underlining) key words which must be used to gain credit ecf = error carried forward AW = alternative wording ora = or reverse argument
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Question	Expected Answers	Marks
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1 (a) *any three of the following for one mark*
mark first three responses, ignore repetition

fat / lipid / triglyceride
carbohydrates / sugars / starch(es)
protein;

1

(b)

one mark for each row tick or cross at end of each row

	vitamin A	vitamin D	essential amino acids	essential fatty acids	
nutrient cannot be synthesised in the body	(✓)		✓	✓	;
nutrient is converted into a protein			✓		;
nutrient deficiency in adults causes osteomalacia		✓			;
nutrient is stored in fat tissue	✓	✓		✓	;
nutrient is converted to a light sensitive pigment in the eye	✓		(✓)		;

5

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(c) *R refs to stunting and other refs to growth*

kwashiorkor / marasmus;

muscle wasting / weak muscle; **A** muscle 'thins', cardiac / heart muscle
weakens

decrease in fat stores / severe weight loss / very skinny / underweight;

decrease in glycogen;

decrease in plasma proteins;

less protein synthesis;

less, enzymes / hormones / antibodies / clotting factors / AW;

water potential of plasma increases;

oedema / swollen tissues / swollen organ(s) / swollen liver / swollen
abdomen;

R swollen stomach

A bloated as swollen

suppression of immune system / increased susceptibility to infections / AW;

A *idea of* (named) infectious disease(s) / pathogens

poor, repair / healing;

named vitamin or mineral deficiencies to max 2

vitamin A, xerophthalmia / night blindness / blindness;

vitamin D, rickets / weak bones / poor absorption of calcium;

vitamin C, scurvy;

vitamin B, beri beri / AW;

iron, anaemia;

calcium, rickets / tooth decay / weak bones;

AVP; e.g. apathy / lethargy / decrease in BMR / lack of concentration

poor mental development

hair, thin / reddish / brittle

moon face

old man's face

poor digestion

max 4

[Total: 10]

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Question	Expected Answers	Marks
2 (a) (i)	<p><i>award two marks if correct answer (77) is given – must be rounded up award one mark for calculation – 2.3 / 3.0 or 76.7 if answer incorrect</i></p> <p>2.3 ÷ 3.0 / 76.7; 77;</p>	2
(ii)	<p>forced expiratory volume decreases / AW; returns to initial value / fluctuates / AW; figs to show a change with correct units / e.g. 2.3 dm³s⁻¹ to 1.5 dm³s⁻¹; A ecf from (i)</p> <p>vital capacity remains constant; at 3.0 dm³;</p>	max 3
(b)	<p>cilia, beat / waft; R 'hairs' A ciliated epithelium, sweeps / AW move mucus; particles / bacteria / dust / spores / pathogen / microbe, in mucus; <i>treat 'dirt' as neutral</i> (moves) away from alveoli / upwards / towards trachea / towards throat / towards mouth / out of lungs / out of bronchioles / AW;</p>	max 3
(c)	<p><i>mark (i) and (ii) together to max 3 – look for annotations on page 6</i></p> <p>ref to (secretion / release of) histamine; mucus is not moved / AW; <u>more</u> goblet cells; (goblet cells secrete / produce) more mucus / excess mucus; fewer cilia (per cell); A stunted, damaged, destroyed R dead</p>	
(ii)	<p>thicker / more, (smooth) muscle; A larger / expands R swollen, swells (muscle) contracts; R constricts, spasm A 'muscle tenses' connective tissue, swells / enlarges / fills with fluid; lining of bronchiole thrown into deeper folds / AW;</p>	max 3
[Total: 11]		

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Question	Expected Answers	Marks
3 (a)	(chronic) bronchitis; emphysema; COPD;	max 2
(b)	damage to, artery wall / lining / endothelium; A scarring R damage to artery / damage in artery invasion by phagocytes; cholesterol / fat / LDLs, deposited / accumulates, <u>in</u> artery wall; growth / proliferation of, smooth muscle / fibrous tissue; wall thickens / <u>lumen</u> becomes narrow / reduces blood flow; rougher surface / AW; A 'stickier' / more friction platelets secrete clotting factor(s); endothelial cells secrete less, anti-clotting factor(s) / prostaglandins; AVP; e.g. atheroma, breaks open / bursts through wall loss of elasticity/ 'walls do not stretch as much'	max 3
(c)	<i>nicotine</i> increases, heart rate / blood pressure (possibly leading to damage to artery walls); A ref to hypertension A for CO as well – but only once in answer decreases width of arteries / lumen smaller / reduces blood flow; increases number of platelets / makes platelets more 'sticky'; decreases antioxidants; <i>CO</i> damages walls of arteries; reduces oxygen carrying capacity of blood / binds with haemoglobin / forms carboxyhaemoglobin; <i>both</i> increase development of, plaque / atheroma; stimulate production of, fibrinogen / clotting factors; reduces production of enzymes that remove clots; increase blood cholesterol (concentration); AVP; e.g. ref to nicotine and adrenalin	max 3
		[Total: 8]

Question	Expected Answers	Marks
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- 4 (a) bone marrow; **R** marrow on own
phagocytes / neutrophils / PMNs / monocytes / macrophages;
thymus;
plasma cells / effector cells;
antibodies; 5
- (b) 1 ref to antigen presentation / described;
2 receptors on T cell (surface) are complementary to antigen; **R** same shape
3 ref to specificity (in context of T cells);
4 clonal selection / described;
5 clonal expansion / clonal proliferation / T cells divide by mitosis;
R 'T cells clone' unqualified / 'reproduction' / 'replication'
- 6 T helper cells release, cytokines / lymphokines;
7 stimulate B cells to, divide / clone / differentiate (into plasma cells);
8 stimulate macrophages to carry out phagocytosis (more actively);
- 9 T_c / cytotoxic / killer (T) cells, search for / kill / attach to, infected (host) cells;
10 secrete, enzymes / toxins;
11 named enzyme / toxin;
e.g. hydrolytic / protease / nuclease / H₂O₂ / free radicals / perforin
- 12 active immunity;
13 memory (T) cells / immunological memory;
- 14 ref to secondary response; e.g. more rapid / greater
- 15 AVP; e.g. suppressor cells
16 AVP; e.g. function of suppressor cells
cell mediated response max 7

QWC – clear, well organised using specialist terms; 1

[Total: 13]

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Question	Expected Answers	Marks
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5 (a) *accept any three valid explanations*
also accept detail about each explanation and/or examples
R refs to falling birth rate and refs to improved medical / health care unqualified

vaccinations;
e.g. smallpox (also in context of eradication) / measles / polio / diphtheria /
whooping cough / AW;
active immunity / herd immunity;

antibiotics;
e.g. streptomycin / penicillin / tetracycline;

improved, hygiene / use of antiseptics / sanitation / sewage treatment / housing
conditions / less overcrowding; **R** 'lifestyle' 'living conditions'

less chance of infectious diseases / named infectious disease, spreading;

improved nutrition / less malnutrition; *for either infants or pregnant women*
further detail; e.g. vitamin A, epithelial tissues (retinoic acid) / protein, antibodies /
folic acid, neural development / spina bifida

AVP; e.g. qualified ref to education
AVP; increased survival of premature babies
 incubators
 prenatal diagnosis

max 3

(b) *for Zimbabwe – ora where appropriate for UK*

fewer named medical resources, e.g. drugs / hospitals / clinics;
rural / isolated, populations;
not able to vaccinate young children / stated reason for poor vaccination rate / AW;
e.g. cold chain / timing of vaccine / record keeping
few, doctors / nurses / medical personnel; **A** less access to medical care
conflict within the country;
(internal) migration / displaced persons / refugees / slum conditions / AW;
famine / crop failure / poor food supply / AW;
poor sanitation / sewage treatment;
poor supplies of clean water / untreated water;
named disease; e.g. malaria / cholera / dysentery / diarrhoeal diseases / parasitic
diseases **R** HIV/AIDS and TB
AVP; e.g. ref to foreign aid
 lack of investment in drug development
 more orphans

max 3

[Total: 6]

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Question	Expected Answers	Marks
6 (a)	<p><u>shared</u> needles or surgical instruments / needles, reused without sterilisation; A contaminated needles reused (mother to child) across placenta / at birth; breast milk / breastfeeding; blood products / blood transfusion; needle-stick / described; AVP; e.g. blood to blood, blood to wound</p>	max 3
(b)	<p><i>mark part (b) to max 6</i></p> <p>(i) decrease; increase / remain constant / fluctuate; correct use of figures to show a change;</p> <p style="padding-left: 40px;">A 'approx / nearly / about / no greater than' to describe numbers e.g. 1985, 2050 1988, 1300 1991, 1680 2001, 1400</p> <p>(ii) earlier diagnosis; use of drugs / named drug e.g. zidovudine / AZT / retrovir; A highly active anti-retroviral therapy / HAART stops replication of virus / controls HIV spread through the body; (drug) delays onset of AIDS;</p> <p>control of, secondary / opportunistic, infections; A bacterial / fungal by antibiotics;</p> <p>(iii) similar number diagnosed each year / ref to figures to make this point; fewer dying / developing AIDS, each year; <i>idea that</i> symptomless carriers increase chance of spread;</p>	max 6

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(c) *R* refs to incidence / prevalence / morbidity / mortality

check progress of a, disease / epidemic;
 help to decide which disease(s) is a priority;
 check effectiveness of, control measures / publicity / education;
 find out which people are at risk;
 estimate number of people who will need treatment;
 help to decide which people should be screened;
 target / plan provision of, resources / drugs / clinics / personnel / education /
 health promotion;
 use of figures in, education / health promotion;
 ref to research;

AVP; e.g. identify factor(s) which increase likelihood of transmission

R find causative organism

ref to alerting other countries / WHO / pandemic

max 3

[Total: 12]