OCR

RECOGNISING ACHIEVEMENT

Subject: Human Health and Disease Code: 2802

Session: January Year: 2002

Mark Scheme

MAXIMUM MARK	90

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 (½) 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.

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
	( )	= 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

Question		Expected Answers	Marks
1	(a)	infectious; deficiency; **R** malnutrition / dietary / self-inflicted **R** 'non-infectious' in all answers inherited / hereditary / genetic / congenital; degenerative; **A** mental / 'degenerate'	4
	(b) (i)	long-term / lasts a long time / gradual onset / continuous / ongoing / AW; NOT severe / intense	1
	(ii)	smoker's / persistent / severe, cough; **R** 'cough' unqualified cough up blood; **R** vomiting large amounts of, phlegm / sputum / mucus; inflammation of, trachea / bronchi / airways; difficult to breathe / breathlessness / shallow breathing / shortness of breath; wheezing; chest pain / tight chest;	max 3
	(c)	people choose to smoke / influenced by social environment / peer pressure / peer preference / accepted social behaviour / smoking is a social activity;	max 1
			[Total 9]

Question	Expected Answers	Marks
2 (a)	(blood vessels / arteries) in the brain / affects the brain; bleeding / haemorrhaging / described; leads to paralysis / loss of memory / speech impediment / AW;	2
(b)	*carbon monoxide* combines with haemoglobin; carboxyhaemoglobin / haemoglobin has high affinity for CO / irreversible; decrease in oxygen transported / taken up, by the blood/ haemoglobin; damages lining of arteries; *max 3* *nicotine* increases, heart rate / pulse; increases, blood pressure / hypertension; increases force of contraction of heart; decrease in flow of blood to, feet / hands / extremities; increases stickiness of platelets; increases chances of, thrombus / clotting; constricts/narrows, arteries / arterioles; increases (blood) cholesterol; *max 3*	**max 4**
(c)	higher in men / lower in women; **A** implied by use of figures a relevant comparison between countries / description of trend; use of figures to make a comparison; (correct use of units needed) AVP; *(e.g. cause / ref. to diet)*	**max 3**
(d)	specific dietary ref.; e.g. ref to saturated fat anti-smoking campaigns / ban tobacco advertising / ban smoking in public places; campaigns to lower alcohol consumption; screening people at risk; drugs for high blood pressure; drugs for lowering cholesterol; encourage / provide (facilities) for, sport / exercise; encourage weight loss / sponsor organisations promoting weight loss; provide hospital facilities for treatment / by pass operations / angioplasty; provide emergency facilities / trained paramedics; AVP;; *(ref. education in schools targetting of population / increased tax on smoking))*	**max 3**
		[Total 12]

Question	Expected Answers	Marks
3 (a)	calcium / Ca; **R** as part of a list rickets; osteomalacia; **A** osteoporosis butter / low fat spreads / margarine / milk / milk products / meat / egg / mango / papaya / cheese / fish / oily fish / named oily fish / breakfast cereal / cod liver oil; skin; sun / sunlight / sunshine / UV light; NOT light unqualified	6
(b)	EAR = mean of the, population / sample; **A** ref. 50% need more, 50% less EAR is the only DRV for energy; RNI = two standard deviations, about / above and below, the mean *or* more than enough for most of the population / AW;	2
(c)	pregnancy; lactation / breast feeding; body building / training / exercise qualified; AVP;; *(e.g. heavy periods / recovery from disease / high metabolic rate / large size)* ***R*** *'menstruation' unqualified*	max 2
(d)	maintenance / repair / replacement; ref bones / organs / tissues; immune system; not able to store protein; AVP;; *(e.g. any 2 protein functions)*	max 2
(e)	individual needs (i.e. planning diets for individual); not generalised / related to specific groups / AW ; ref advice / education / information, for general public / consumers; analysing dietary surveys; use by dieticians / constructing diets (i.e. for schools/hospitals/institutions); food labelling / selling / marketing;	max 2
(f)	measles is highly infectious; poor development of immune system / few lymphocytes / few T/B cells; weakened immune system; antibodies are proteins, fewer are made / AW; ora vitamin A deficiency; poor maintenance of epithelia (virus enters through nose / mouth etc); ref. to need for booster vaccination (as initial vaccination does not work);	max 2

(g) (carbohydrate used) to provide energy;
carbohydrate easily respired;
saves protein from being respired;
high quality protein provides (all) essential amino acids;
energy / protein, needed for growth / repair / replacement;
AVP; e.g. ref cost of diets

max 2

[Total 18]

Question		Expected Answers	Marks
4	(a)	goblet; makes / secretes, mucus / mucin;	2
	(b)	bronchiole, bronchus, trachea;	1
	(c)	produces, more / viscous / stickier / thicker, mucus; enlarged / swollen;	1 max
	(d)	columnar / ciliated;	1
	(e)	*one mark for each function* *cartilage* supports / strengthens, airways / trachea / bronchi; keeps airways open / prevents collapse of airways; ensures low resistance to air flow; max 1 *smooth muscle* decreases / changes the diameter of, bronchioles / bronchi / trachea / airways; *elastic fibres* recoil when breathing out / help, force air out of lungs / expiration;	max 3
	(f)	*look for any annotations on Fig. 4.2* regular / normal / steady, breathing at start / AW; tidal volume (in context); figure from trace / 500 $\underline{cm^3}$ / 0.5 $\underline{dm^3}$; (**A** 400-600) *must have units (**A** litres)* took a deep breath; breathed out hard / forced expiration/exhalation; vital capacity (in context); **A** a definition figure from trace e.g. 4.75 $\underline{dm^3}$; (**A** 4.5 – 5) any correct ref. to breathing rate; fall in trace correctly linked to, CO_2 / O_2 ; returned to normal (at K); AVP; e.g. breathing slows towards deep breath	max 4
			[Total 12]

Question		Expected Answers	Marks
5	(a)		
	1	increased demand for energy;	
	2	increased production of ATP;	
	3	aerobic respiration; **A** equation	
	4	ref mitochondria;	
	5	in muscles;	
		increases in	
	6	volume of air into the lungs (per minute / per breath) / deeper breathing;	
	7	volume of blood pumped around the body, per beat / per minute;	
	8	volume of blood to muscles;	
	9	to supply oxygen to muscles;	
	10	to supply glucose to muscles;	
	11	remove carbon dioxide;	
	12	remove lactate / lactic acid;	
	13	remove heat;	
		refs to any of the following ***to max 2 (in 14-20)***	
	14	ventilation rate, up 84 $dm^3 min^{-1}$ / 1400% / x 15;	
	15	oxygen consumption, up 2250 $cm^3 min^{-1}$ / 900% / x 10;	
	16	breathing rate, up 12 breaths min^{-1} / 100% / x 2;	
	17	cardiac output, up 20 $dm^3 min^{-1}$ / 400% / x 5;	
	18	heart rate, up 120 beats min^{-1} / 171% / x 2.7;	
	19	stroke volume, up 61cm^3 / 86% / x 1.9;	
	20	blood pressure, up 11kPa / 73% / x 1.7;	
	21	AVP; *(e.g. explanation of systolic bp increase*	
	22	AVP; */ role of adrenaline)*	**max 7**
		Q – clear, well organised using specialist terms;	**1**
			max 8

(b) inadequate oxygen (supply) / AW;
anaerobic, respiration / exercise;
lactate / lactic acid;
pH falls;
enzymes work less efficiently / AW;
less energy available;
(muscle) pain / fatigue / cramp; **R** 'tired muscles'
oxygen, debt / deficit;

max 3

(c) decrease in resting heart rate / maintenance of low resting heart rate;
increase in, stroke volume / cardiac output;
increase in size of heart / heart muscle / ventricles / hypertrophy;
increase in mitochondria / myoglobin, in heart muscle;
larger muscle fibres;
decrease in (systolic) blood pressure / maintenance of normal blood pressure;
prevents hypertension;
reduces risk of CHD / heart attacks / AW ;

max 3

treat 'heart stronger' as a neutral point

[Total 14]

Question		Expected Answers		Marks
6	(a)	sexual intercourse / in semen / vaginal fluid / AW; reusing / sharing, (hypodermic) needles; from mother to fetus / across placenta / during birth; breast milk; (infected) blood transfusions / blood products;	**A** 'sexual contact'	**max 3**
	(b)	*problems with transmission / prevention / treatment*		
	1	providing enough condoms;		
	2	encouraging people to use them;		
	3	discouraging sexual promiscuity / prostitution;		
	4	discouraging needle sharing;		
	5	difficult to promote needle exchange schemes;		
	6	cultural resistance to, education / campaigns, about 'safer sex';		
	7	checking blood donations / blood donors;		
	8	lack of money, to buy drugs / for treatment (to control AIDS);		
	9	lack of a cure;		
	10	lack of a vaccine;		
		social and other health problems		
	11	isolated rural areas / migration;		
	12	poorly educated population;		
	13	slums / shanties;		
	14	poor health facilities;		
	15	few health professionals;		
	16	illiteracy;		
	17	contact tracing;		
	18	other named health problems (e.g. TB / malnutrition);		
	19	ref under-reporting / misdiagnosis / unaware of HIV status / AW;		
	20	civil war / political instability;		
	21	AVP; *(e.g. high birth rate)*		
	22	AVP;	**R** 'cost' unqualified	**max 6**
		Q – legible text with accurate spelling, punctuation and grammar		**1**
				max 7
			[Total	**10]**

Question			Expected Answers	Marks
7	(a)	(i)	clonal selection; ref. to receptors / antibodies (on **P / Q / R**); further qualification; (ref. to **P / Q / R** or right / wrong shape of receptor / Ag) ref to specificity; clonal expansion / form clone / divide / increase number / mitosis; memory cells;	**max 3**
		(ii)	plasma / effector (cells);	**1**
	(b)	(i)	no immune response; antibodies, not made / come from other source; high concentration, immediately / after injection; antibody concentration falls / AW; day 0-1, maximum concentration / figure from graph; does not last long / only approx 2 weeks / temporary;	**max 2**
		(ii)	**A** *converse points for active immunity* immediate protection; antigen / toxin, neutralised / inhibited; few / no, symptoms;	**max 2**
	(c)		*time needed for* antigen presentation; clonal selection / AW; clonal expansion / mitosis / AW; ref to T helper cells; differentiation of B cells into plasma cells; growth of cells / details of plasma cell structure; antibody, production / synthesis / release from plasma cells;	**max 4**
	(d)		immunological memory; memory cells; produced in clonal expansion; remain in lymph / blood; secondary response; rapid; larger production of antibody; ref to IgG; (more produced in 2^{o} response than in 1^{o})	**max 3**
				[Total 15]