

Mark Scheme 2802
January 2006

HUMAN HEALTH +
DISEASE

(b) bar for pregnancy higher than normal ;
bar for breast feeding higher than pregnancy (and normal) ; 2

(c) protein needed to allow fetus to, grow / develop ; A baby
growth of mother's, cells / tissues ;
used for growth of named tissue (maternal or fetal) ;
e.g. placenta, umbilical cord, bone, muscle
for production of, milk / colostrum ; A milk contains protein
after birth baby growing more quickly ;
repair mother's tissues damaged during birth ;
AVP ; e.g. making antibodies for baby

A ecf from answer to (b) e.g. baby gets milk from other source, weaning (if breast 2
feeding lower than pregnancy) max

[Total: 9]

2 (a)

mental

Alzheimer's / schizophrenia / phobia / anorexia / depression / Parkinson's /
Huntington's / CJD / AVP ;

self-inflicted

alcoholism / cirrhosis / smoking addiction / drug addiction / lung cancer / obesity /
CHD / anorexia / AVP ; R unnamed cancer

inherited

sickle cell / haemophilia / cystic fibrosis A CF / diabetes / Huntington's / Down's
syndrome / AVP ;

3

- (b) (i) to find out where, rates are highest / people are most at risk ;
to keep track of infection rates over time ;
to see where, disease is likely to spread / epidemic most likely ;
to help research (into how it is spread / into effectiveness of drugs) ;
to allow organisations to provide aid where it is needed most ;
to allow organisations to provide education (about disease) where it is needed
most ;

AVP ; e.g. tourist industry
e.g. limit potential spread by migration or imports

3 max

- (ii) education on HIV/AIDS less effective in Africa ;
sexual attitudes / number of partners ;
availability of condoms ; R general reference to contraceptives, not used /
refused
poverty / poorer / less money ;
sex industry ;
less primary health care / less likely to be diagnosed ;
AVP ; e.g. ref. to unscreened or untreated blood
unsterilised needles or surgical apparatus
civil war / rape
no alternative to breast feeding
R access to drugs for treatment
R no vaccine
R ref to intravenous drug addiction

2 max

- (c) find person who is immune ;
isolate gene that provides immunity ;
identify protein (receptor) that provides immunity ;
develop drug (to fit normal receptor) that provides immunity ;

(gene used to) manufacture, drug, protein / antibody / immunoglobulin, giving
immunity ;

protein used as, vaccination / cure / AW ;

gene therapy used in at risk groups / AW ;

AVP ;

AVP ;

2 max

[Total: 10]

Question	Expected Answers	Marks
3 (a)	(i) phagocyte / macrophage / dendritic cell ; A antigen presenting cell / APC R white blood cell / lymphocyte / neutrophil	1
	(ii) bacteria in vacuole / phagosome ; A lysosome bacterium, cut up / partly, digested / partly broken down / AW (so antigens still whole) ; enzymes / lysins / lysozyme ; AVP ; e.g. hydrolysis / hydrolases	2 max
	(iii) receptors / binding sites ; on cell surface membrane (of T helper cell) ; <u>complementary</u> to antigen ; R matching A analogy to lock and key	2 max
	(iv) <u>mitosis</u> ; R cloning	1
	(v) produced during, primary / first, immune response / exposure to antigen ; remain in body ; A blood / tissue fluid etc (memory cell or antibody) specific to antigen ; produce secondary response ; more quickly / no symptoms ; divide / clone, to make plasma cells ; (plasma cells) manufacture antibodies ; more antibodies made / antibodies accumulate faster ; gives long term immunity / immunological memory / AW ;	4 max
(b)	variable region binds to, antigen / pathogen ; A antigen-binding site variable region specific to, antigen / pathogen ; A antigen-binding site agglutinate pathogens / stick pathogens together ; immobilise pathogens / attach to flagellum (of pathogen) ; combine with pathogen to stop entry to cell ; break wall of bacterium open / lysis ; constant region, attracts phagocytes / makes it easier to engulf bacterium ; AVP ; e.g. ref to hinge region in context	2 max

[Total: 12]

Question	Expected Answers	Marks
4 (a)	<p><i>Mycobacterium tuberculosis</i> / <i>Mycobacterium bovis</i> ; A <i>M. tuberculosis</i> / <i>M. bovis</i> / <i>Mycobacterium</i></p> <p>R <i>Microbacterium</i> / <i>Myobacterium</i></p>	1
(b)	<p>many, air spaces / alveoli ; large surface area ; R ref to surface area to volume ratio thin wall of, alveolus / capillary ; A one cell thick R 'thin wall' on its own good blood supply / large capillary network ; air passage / bronchiole ; capillary close proximity to alveolus ;</p> <p>R refs. to cilia, mucus, elasticity</p>	3 max
(c)	<p>short of breath / breathless / less easy to inflate lungs or breathe ; due to less surface area for gaseous exchange ; less oxygenation of, blood / haemoglobin ; R oxidation coughing due to irritation in lungs (alveoli filled with some substance) ; coughing up blood ; longer diffusion pathway ; as alveoli walls thicker ;</p> <p>AVP ; e.g. destruction / loss of, alveoli and blood vessels AVP ; weight loss chest pain when coughing</p>	2 max
(d)	<p>opportunistic disease / immune system already weakened ; long course of treatment not always completed ; drug / antibiotic, resistance ; R strand R mutation alone vaccine is less than 100% effective / no vaccine for mutated strains / more effective in some parts of world ; symptomless carriers / dormant in body ; lack of education about TB ; overcrowding (in poorly ventilated accommodation) ; Less Economically Developed Countries cannot afford, treatment / drugs / vaccines ; A lack of access malnutrition ; untreated milk / uncooked meat ; breakdown of treatment programmes due to, war / civil unrest ; migration of carriers / refugees / tourists / AW ;</p> <p>AVP ; e.g. link to HIV/AIDS AVP ; ref badgers as carriers spitting / in sputum poverty, increased homelessness vaccine, refused / not wanted</p>	5 max

Total: 11]

Question	Expected Answers	Marks																		
5 (a)	<p>(chronic) bronchitis ; emphysema ; COPD ; heart disease ; stroke ; <i>two marks available for the following</i> lung / mouth / throat / breast / bladder / oesophagus / prostate other named cancer ;; AVP ; e.g. gangrene, erectile dysfunction AVP ;</p>	2 max																		
(b)	<p><i>max 3 for each named component</i> <i>carbon monoxide (no mark)</i> c1 binds to haemoglobin / forms carboxyhaemoglobin ; c2 irreversibly / permanently ; A greater affinity than for oxygen c3 less effective oxygenation of haemoglobin ; R oxidation c4 shortage of breath ; c5 damages lining of arteries ; c6 AVP ;</p> <p><i>nicotine (no mark)</i> n1 addictive ; n2 adrenaline released ; n3 increases heart rate ; n4 reduced circulation to extremities / vasoconstriction ; R contract A narrow lumen n5 sticky platelets ; n6 cause blood clotting / thrombosis ; n7 AVP ; e.g. ref to effect on synapse / brain function</p> <p><i>tar (no mark)</i> t1 coats the (internal) surfaces of breathing system ; A lungs t2 reducing efficiency of exchange ; t3 irritation of mucous membranes ; t4 goblet cells stimulated / over secretion of mucus ; t5 inactivation of, cilia / ciliated epithelium ; A destroys / damages R kills t6 mucus not moved ; t7 coughing ; t8 carcinogenic / cancer-causing / causes mutations ; t9 causes emphysema / described ; R ref to elastin damage alone t10 AVP ; e.g. ref to more infections / increased risk of chronic bronchitis</p>	<p>max 3</p> <p>max 3</p> <p>max 3</p>																		
	<p><i>may be awarded anywhere</i> AVP ; strain on heart / heart disease AVP ; raised blood pressure / hypertension</p>	8 max																		
	<p>QWC – clear well organised using specialist terms ; <i>award the QWC mark if four of the following are used in the correct context</i></p> <table> <tr> <td>haemoglobin</td><td>carboxyhaemoglobin</td><td>affinity</td></tr> <tr> <td>oxygenation</td><td>addictive</td><td>adrenaline</td></tr> <tr> <td>vasoconstriction</td><td>lumen</td><td>platelets</td></tr> <tr> <td>thrombosis</td><td>mucous membranes</td><td>goblet cell</td></tr> <tr> <td>cilia</td><td>epithelium</td><td>carcinogenic</td></tr> <tr> <td>emphysema</td><td>bronchitis</td><td>hypertension</td></tr> </table>	haemoglobin	carboxyhaemoglobin	affinity	oxygenation	addictive	adrenaline	vasoconstriction	lumen	platelets	thrombosis	mucous membranes	goblet cell	cilia	epithelium	carcinogenic	emphysema	bronchitis	hypertension	1
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6 (a) (i)	award two marks if correct answer (0.55 – 0.65) is given incorrect answer (or no answer) but correct working = 1 mark ecf rules apply for 1 mark max	
	working ; (marks on graph or calculation) 0.55 – 0.65 ;	2
	(ii) vital capacity ;	1
(b) (i)	tidal volume increases / AW ; A amplitude (of trace) increases rate of breathing increases / AW ; A frequency (of trace) increases / wavelength gets shorter trace will fall more steeply / AW ;	2 max
(ii)	increased, heart / pulse rate ; R blood pumped faster increased stroke volume ; increased cardiac output ; blood pressure rises ; blood diverted to muscles / vasodilation in muscle ; blood diverted away from digestive system / vasoconstriction in, digestive system / kidney ; less (at first) / more (later on), blood to skin ;	2 max
		[Total: 7]