

Question			Expected Answers	Mark	Additional Guidance
1	(a)	(i)	<p><u>lives</u> , in / on , <u>host</u> ;</p> <p>gains nutrition / feeds , from (host) ;</p> <p>at the expense of / harms (host) ;</p>	3	<p>The word 'host' must appear at least once in order to gain 3 marks</p> <p>IGNORE lives off host IGNORE binds to host</p> <p>ACCEPT e.g. feeds on blood / get food from it / obtains nutrients from the larger organism</p> <p>DO NOT CREDIT sometimes harm ACCEPT causes disease</p>
1	(a)	(ii)	<p>mosquito / vector / <i>Anopheles</i> , feeds on blood ;</p> <p>breaks <u>skin</u> / <u>skin</u> cannot act as barrier / mosquito pierces <u>skin</u> / mosquito bites <u>skin</u> ;</p>	2	<p>IGNORE insect</p> <p>IGNORE anticoagulant prevents clot formation (as primary defence has already been breached)</p>

Question			Expected Answers	Mark	Additional Guidance
1	(a)	(iii)	<p>suitable / AW , climate / temperature , for , mosquito / vector / <i>Anopheles</i> ; ora</p> <p><u>more</u> mosquitoes live there / AW ; ora</p> <p><i>idea of</i> relatively poor so methods of prevention less effective ;</p>	1	<p>ACCEPT 'warm enough for mosquitoes'</p> <p>IGNORE tropical as AW for 'warm'</p> <p>IGNORE mosquito is adapted to survive there</p> <p>ACCEPT e.g. can't afford , drugs / mosquito nets / habitat management / insecticides</p> <p>ACCEPT lack of education</p>
1	(a)	(iv)	<p>1 climate change / global warming / AW , may result in <u>spread</u> to other parts of the world / AW ;</p> <p>2 <i>idea of</i> <u>increased</u> movement of (infected) people ;</p> <p>3 <i>idea that</i> (non-malaria) countries fund anti-malaria measures via international aid ;</p> <p>4 resistance of , parasite to drugs / mosquito to insecticides ;</p>	2 max	<p>2 ACCEPT increased tourism / easier to travel</p> <p>2 ACCEPT inadvertent transport of mosquitoes</p> <p>4 IGNORE 'resistance' without further qualification</p> <p>4 DO NOT CREDIT immune</p>
1	(b)	(i)	<p>A antigen ;</p> <p>B (extension of) cytoplasm ;</p> <p>C lysosome ;</p> <p>D phagosome / phagocytic vesicle / phago-lysosome ;</p>	4	<p>Mark the first answer. If the answer is correct and another answer is given that is incorrect or contradicts the original answer, then = 0 marks</p> <p>B ACCEPT pseudopod (ia / ium) or close spelling</p> <p>B IGNORE neutrophil</p> <p>C IGNORE lysome / lysozyme</p> <p>D ACCEPT phagocytic vacuole / secondary lysosome</p>

Question			Expected Answers	Mark	Additional Guidance
1	(b)	(ii)	(different) chemicals that attract phagocytes (released from infected erythrocytes) ;	1	ACCEPT in the context of chemicals released by erythrocyte or <i>Plasmodium</i> ACCEPT cytokines / histamine / interleukin , released IGNORE references to antigens on surface
1	(c)		<p><i>Globular</i></p> <p>G1 ball (shaped) / spherical / AW ;</p> <p>G2 hydrophilic , (R-)groups / regions , on outside (of 3-D structure) / hydrophobic (R-)groups on inside ;</p> <p>G3 form H-bonds with water ;</p> <p>G4 soluble ;</p> <p>G5 example of globular protein (other than haemoglobin) ;</p> <p>H1 haemoglobin , carries / transports , oxygen / carbon dioxide ;</p> <p>H2 haemoglobin contains , prosthetic group / haem / Fe²⁺ / iron ion (to allow oxygen to be carried) ;</p> <p>H3 (polypeptide chains within) haemoglobin have tertiary structure (in a ball shape) ;</p>	1	<p>G1 IGNORE round / globular</p> <p>G5 ACCEPT (named) enzyme / hormone / antibody / channel / carrier G5 IGNORE metabolic / transport</p> <p>H1 ACCEPT references to buffering</p> <p>H2 IGNORE Fe³⁺</p> <p>H3 ACCEPT haemoglobin has tertiary structure</p>

			<p>F1</p> <p>F2 (within a molecule) ;</p> <p>F3 insoluble / few hydrophilic groups ;</p> <p>F4 strong / provide strength ;</p> <p>F5 have <u>structural</u> role ;</p> <p>C1 collagen has high proportion of glycine , so chains can lie close together / AW ;</p> <p>C2 collagen forms , crosslinks / covalent bonds , <u>between molecules</u> ;</p> <p>C3 crosslinks / ends of molecules, are staggered to avoid , weak points / AW ;</p> <p>C4 collagen forms part of , tendon / cartilage / ligament / bone / connective tissue / bronchi / bronchioles / trachea / skin ;</p>		
				7 max	
			QWC – use of haemoglobin and collagen as examples	1	AWARD if any H mark and any C mark are awarded
			Total	[21]	

Question		Expected Answers	Mark	Additional Guidance
2	(a)	<p>1 2 light chains and 2 heavy chains / 4 polypeptide chains ;</p> <p>2 variable region allows , binding / attachment , to <u>antigen</u> ;</p> <p>3 two variable regions allow binding of <u>more than one</u> (of the same) <u>antigen</u> ;</p> <p>4 variable region on different antibodies allows <u>specificity</u> to <u>different antigens</u> ;</p> <p>5 <u>constant</u> region allows , recognition by / attachment to / binding to , (named) phagocytes ;</p> <p>6 hinge (region) allows flexibility ;</p> <p>7 disulfide , bonds / bridges , hold , polypeptides / light and heavy chains , together ;</p>	6 max	<p>CREDIT marking points from a suitably annotated correctly labelled diagrams but read text first</p> <p>1 IGNORE long / short 1 CREDIT implication from labelled diagram</p> <p>2 IGNORE complementary 2 ALLOW AW for region</p> <p>3 ALLOW AW for region</p> <p>4 ALLOW AW for region</p> <p>5 ALLOW AW for region 5 IGNORE complementary</p> <p>6 ACCEPT allows arms to , move / bend</p>
		QWC – statements linking structure and function for variable region and one other region	1	AWARD if one mark from 2 to 4 and one mark from 5 to 7 are given

Question		Expected Answers	Mark	Additional Guidance
2	(b)	<p><i>neutralisation</i></p> <p>N1 cover / block , binding site / antigen / receptor site (on pathogen) ;</p> <p>N2 bind to toxins ;</p> <p>N3 prevent , binding / entry , to (host) cell ;</p> <p><i>agglutination</i></p> <p>A1 clump / bind together , (many) pathogens ;</p> <p>A2 (clump) too large to , enter (host) cell / cross membranes ;</p> <p>A3 increase likelihood of being consumed by (named) phagocyte / more can be consumed by phagocyte at once ;</p>	4	<p>If neutralisation is correctly described but labelled agglutination, DO NOT CREDIT the first mark but apply ECF thereafter</p> <p>IGNORE references to parts of antibody, e.g. variable / constant</p> <p>N1 IGNORE binds</p> <p>N3 IGNORE prevent pathogen reproduction</p> <p>N3 GNORE 'harm / infect , host cell'</p> <p>If neutralisation is correctly described but labelled agglutination, DO NOT CREDIT the first mark but apply ECF thereafter</p> <p>A2 IGNORE move</p> <p>A3 IGNORE 'white blood cell'</p> <p>A3 DO NOT CREDIT lymphocyte</p> <p>A3 ACCEPT eaten by phagocytes more easily</p>
Total			[11]	

Question		Answer	Mark	Guidance
3	(a)	antigen(s) ; specific ; memory ; strain ; mutation ;	5	
3	(b)	1 immunity involves / bacteria do not have , lymphocytes / white blood cells / antibodies / memory cells / plasma cells / an immune system ; 2 (correct term is) resistant ; 3 bacteria are unicellular / only multicellular organisms (can) have an immune response;	3	
		Total	8	

Question			Answer	Marks	Guidance
4	(a)	(i)	B <u>and</u> C ;	1	Both need to be given for the mark to be awarded. DO NOT CREDIT if A also given.
4	(a)	(ii)	(involved) after , pathogen / AW , has entered the body ;	1	IGNORE ref to primary defence without the clear idea that the pathogen has <u>entered the body</u> IGNORE refs to mechanisms of action, e.g. 'phagocytes do not make antibodies' ACCEPT attacking foreign bodies after they have <u>passed through the skin</u>
4	(a)	(iii)	(phagocytes) able to, digest / break down / engulf / target / deal with, a range of / many different , pathogens ; ora	1	ACCEPT bacteria or virus as synonym for pathogen if the idea of a variety is clearly present ACCEPT phagocytes can break down <i>any</i> pathogen ACCEPT phagocytes do not have (antigen-)specific receptors IGNORE phagocytes do not make memory cells IGNORE antigen if used as synonym for pathogen
4	(a)	(iv)	1 lobed / narrow , nucleus ; 2 (cells) can change shape ; 3 can squeeze / move / fit / AW , between cells / through pores , in (walls of) capillaries ; 4 histamine makes , capillary walls / endothelium , leaky ;	2	2 ACCEPT in context of cell or nucleus 2 ACCEPT cells , are plastic / have flexible structure / have flexible membrane 2 IGNORE squashable / stretch 3 ACCEPT holes / gaps / fenestrations

Question			Answer	Marks	Guidance
4	(a)	(v)	<p>1 (pathogen) engulfed / enveloped / surrounded by cytoplasm (from phagocyte) ;</p> <p>2 <u>endocytosis</u> / <u>phagocytosis</u> ;</p> <p>3 (formation of) <u>phagosome</u> / <u>phagocytic vacuole</u> / <u>phagocytic vesicle</u> ;</p> <p>4 (phago) <u>lysosomes</u> ;</p> <p>5 (lysosomes / phagosome) move towards / fuse with (each other) ;</p> <p>6 (named) enzyme(s) / lysins / hydrogen peroxide / free radicals (in lysosomes) ;</p> <p>7 (pathogen) digested / broken down / hydrolysed ;</p> <p>8 (to) amino acid / sugar / glucose / fatty acid / glycerol ;</p> <p>9 (break down products) absorbed / AW (into cytoplasm) or unwanted products removed (by exocytosis) ;</p> <p>10 cytoskeleton involved in (endocytosis / movement of vesicles) ;</p>	6	<p>ACCEPT phonetic spellings throughout</p> <p>1 ACCEPT 'pseudopodia / cytoplasm / cell membrane , extend from phagocyte'</p> <p>1 DO NOT CREDIT eaten. ACCEPT ingested</p> <p>3 CREDIT in correct context only</p> <p>5 ACCEPT attracted to / joins</p> <p>7 IGNORE destroyed / broken up / killed</p> <p>9 IGNORE refs to antigen presentation 9 ACCEPT enter cytoplasm</p>
			<p>QWC key points in sequence ;</p>	1	<p>Award if the following mark points have been awarded: mp 1 or 2 followed by mp 6 or 7</p>

Question			Answer	Marks	Guidance
4	(b)	(i)	<u>Mycobacterium</u> / <i>M. tuberculosis</i> / <i>M. bovis</i> ;	1	ACCEPT phonetic spellings IGNORE case of initial letter No need to underline
4	(b)	(ii)	droplets (containing pathogen) ; (released by) coughing / sneezing ; inhaled by (uninfected) , individual / AW ;	2	IGNORE airborne IGNORE laughing / talking / kissing / breathed out

Question			Answer	Marks	Guidance
4	(c)	(i)	<p>1 <u>in both years</u> incidence (of TB) , decreases / AW , as income , increases / AW ; ora</p> <p>2 no change in, low / lower middle, (income groups) ;</p> <p>3 increase in upper middle (income group) ;</p> <p>4 decrease in high (income group) ;</p> <p>5 <i>idea of overall</i> very little change between 2000 and 2008 ;</p> <p>6 <u>calculated difference</u> in figures with units to support points 3 to 5 ;</p>	3	<p>Mark points 1-5 cannot be inferred from figures</p> <p>1 ACCEPT 'incidence is higher in low income group and lower in high income group, in both years / always'</p> <p>3 ACCEPT upper middle less in 2000</p> <p>4 ACCEPT high (group) more in 2000</p> <p>6 ACCEPT any increase or decrease e.g., high group has gone down by 3 per 100000</p> <p>6 ACCEPT also</p> <ul style="list-style-type: none"> • 10% increase in upper middle group • 17.6% / 18% , decrease in high income group • 1% / 1.3% , increase overall • high income group in 2008 is , 82.4% / 82% / 0.824 / 0.82 , of original value <p>6 IGNORE 0% increase in low / lower middle income groups</p> <p>There is no need to refer to years as only 2 are shown</p>

Question			Answer	Marks	Guidance
4	(c)	(ii)	<p>1 overcrowded / AW (living space) ;</p> <p>2 poorly ventilated (living space) ;</p> <p>3 poor diet / malnourished ;</p> <p>4 poor health ;</p> <p>5 homelessness ;</p> <p>6 <i>idea that</i> more likely to consume , meat / milk, from infected cattle ;</p> <p>7 <i>idea of</i> vaccination / medical treatment , more difficult to access ;</p>	3	<p>IGNORE prompt lines and mark as prose</p> <p>1 ACCEPT cramped</p> <p>4 ACCEPT poor immune system</p> <p>4 IGNORE hygiene / standard of living</p> <p>7 CREDIT healthcare more expensive</p> <p>7 ACCEPT poor healthcare</p> <p>7 IGNORE less aware of the risks</p>
			Total	21	