

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>

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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>

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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 Fibrous linear / long (chain) ;</p> <p>F2 (chains can) form (H) bonds with adjacent , chains (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</u> <u>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>		<p>F1 ACCEPT straight / rope-like F1 IGNORE strand</p> <p>F2 IGNORE fibre / fibril F2 ACCEPT 'strand' as AW for 'chain' for F2 only F2 ACCEPT crosslink as AW for bond for F2 only F2 DO NOT CREDIT molecule as 'AW' for 'chain' F2 IGNORE attractions / (named) covalent bonds</p> <p>F4 IGNORE flexible / inelastic / withstands pressure</p> <p>C2 ACCEPT (micro / macro) fibrils / fibres , as AW for molecules</p> <p>C3 ACCEPT (micro / macro) fibrils / fibres , as AW for molecules</p> <p>C4 IGNORE blood vessel / artery / vein , wall C4 IGNORE lips</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	