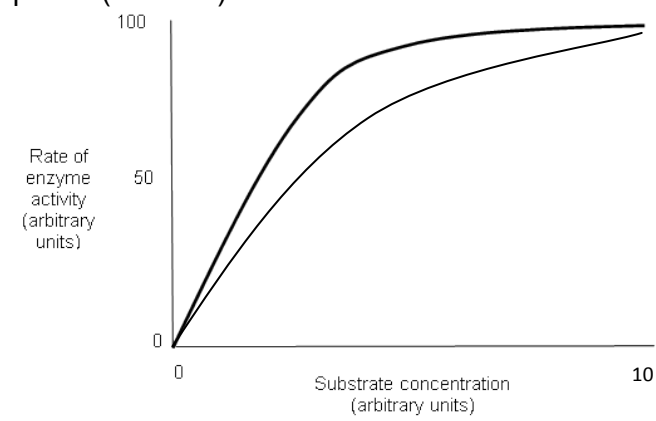


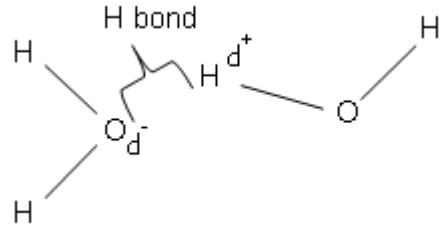
Question			Expected Answers	Mark	Additional Guidance
1	(a)	(i)	peptide (bond / link) ;	1	DO NOT CREDIT dipeptide
	(a)	(ii)	hydrolysis ; water / H ₂ O , is , added / used / needed ;	2	IGNORE name of bond CREDIT OH and H put back on amino acids ACCEPT (broken down) with water
	(b)		<p>1 substrate / protein , shape is (nearly) <u>complementary</u> to <u>active site</u> ; ora</p> <p>2 substrate / protein , enters / fits into , <u>active site</u> (on enzyme) ;</p> <p>3 induced fit / description of induced fit ;</p> <p>4 (forms) enzyme-substrate complex / ESC ;</p> <p>5 destabilising / straining / AW , of <u>bonds</u> (in substrate) ; then (forms) enzyme-product complex ;</p> <p>6 product(s) / amino acids , leave (active site) ;</p>	5 max	<p>1 ACCEPT complimentary</p> <p>1 “substrate binds to the active site which is complementary to the substrate shape” = 2 marks, mp1 and mp2</p> <p>2 ACCEPT binds to / holds / bonds to</p> <p>2 IGNORE collides</p> <p>5 IGNORE breaks</p> <p>6 IGNORE EPC</p>
	(c)	(i)	<p>no units for , 2nd column / egg white ;</p> <p>amount (rather than volume / in 4th column) ;</p> <p>incorrect unit / m , in final / time , column ;</p>	3	<p>IGNORE prompt, and mark the first three answers. IGNORE subsequent answers. CREDIT marks clearly annotated on table</p> <p>ACCEPT volume of egg white needs cm³</p> <p>ACCEPT ‘they should have written volume’</p> <p>ACCEPT should have been s IGNORE should have been , sec / secs / seconds</p>

Question		Expected Answers	Mark	Additional Guidance
	(c) (ii)	equal <u>volume</u> in each tube ; add buffer / control pH ;	1	ACCEPT "make sure the tubes have the same cm ³ "
	(c) (iii)	<u>control</u> ;	1	DO NOT CREDIT control variable
	(c) (iv)	improve reliability ; assess, variability / spread of results ; allows calculation of <u>mean</u> ;	2	IGNORE accurate ACCEPT identify , anomalous results / outliers IGNORE eliminate anomalous results ACCEPT reference to statistical test ACCEPT standard deviation / t-test / Mann-Whitney CREDIT improves accuracy of mean
	(d) (i)	line drawn below line on graph ; line from origin that does not peak or plateau ;	2	If the line goes above the original line at any point = 0 marks ALLOW lines touching at right hand end DO NOT CREDIT line with increasing gradient ALLOW plateau if it joins the original line ALLOW plateau below original line if it starts 4 small squares (or fewer) from the end  <p style="text-align: right;">= 2 marks</p>

Question		Expected Answers	Mark	Additional Guidance
	(d)	(ii)		IGNORE same ACCEPT same shape as part of substrate IGNORE structure ACCEPT tertiary structure
			2	
			Total	[19]

Question			Expected Answers	Mark	Additional Guidance																																			
2	(a)	(i)	<table border="1"> <thead> <tr> <th>Statement</th> <th>tri-glyceride</th> <th>phospho-lipid</th> <th>cholest erol</th> <th></th> </tr> </thead> <tbody> <tr> <td>contains only the elements carbon, hydrogen and oxygen</td> <td>✓</td> <td></td> <td>✓</td> <td>;</td> </tr> <tr> <td>insoluble in water</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>;</td> </tr> <tr> <td>contains glycerol</td> <td>✓</td> <td>✓</td> <td></td> <td>;</td> </tr> <tr> <td>contains ester bonds</td> <td>✓</td> <td>✓</td> <td></td> <td>;</td> </tr> <tr> <td>important in membrane structure</td> <td></td> <td>✓</td> <td>✓</td> <td>;</td> </tr> <tr> <td>contains fatty acids</td> <td>✓</td> <td>✓</td> <td></td> <td>;</td> </tr> </tbody> </table>	Statement	tri-glyceride	phospho-lipid	cholest erol		contains only the elements carbon, hydrogen and oxygen	✓		✓	;	insoluble in water	✓	✓	✓	;	contains glycerol	✓	✓		;	contains ester bonds	✓	✓		;	important in membrane structure		✓	✓	;	contains fatty acids	✓	✓		;	6	<p>AWARD one mark per correct row ACCEPT use of an unambiguous symbol other than a tick (e.g. Y) DO NOT CREDIT if there is any ambiguity in the symbol used</p>
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	(b)		mix with / add , ethanol / alcohol , and water ; (goes) cloudy ;	2	<p>DO NOT CREDIT reference to any incorrect biochemical test</p> <p>ACCEPT milky / white (emulsion) DO NOT CREDIT precipitate</p>																																			
	(c)		less (overall , lipid / fat) ; less / no , <u>saturated</u> (fat / lipid / fatty acids) ; more <u>unsaturated</u> (fat / lipid / fatty acids) ;	2 max	<p>Cannot be inferred from marking points 2 and 3 ACCEPT no / less , cholesterol ACCEPT meat has more</p> <p>ACCEPT meat has more</p> <p>ACCEPT meat has less</p> <p>“Higher ratio of unsaturated to saturated” = 2 marks (mp 2 and 3)</p>																																			
			Total	[10]																																				

Question			Answer	Mark	Guidance
3	(a)	(i)	<i>primary</i> B <u>and</u> D ;	1	DO NOT CREDIT if another letter is shown
		(ii)	<i>secondary</i> A <u>and</u> E ;	1	DO NOT CREDIT if another letter is shown
		(iii)	<i>tertiary</i> F <u>and</u> G ;	1	DO NOT CREDIT if another letter is shown
		(iv)	<i>quaternary</i> C;	1	DO NOT CREDIT if another letter is shown

Question	Answer	Mark	Guidance
(b) (i)	<p>1 between O and H (of adjacent molecules) ; 2 between , electropositive / δ^+ / delta⁺ (H), and , electronegative / δ^- / delta⁻ (O) ;</p> <p>3 water molecule , is polar / has charge separation ;</p>	3	<p>1 DO NOT CREDIT O/H molecules 2 ACCEPT slightly , positive / negative 2 IGNORE oxygen is negative / hydrogen is positive 2 DO NOT CREDIT ions AWARD mp 1 and 2 for diagram below, i.e. H bond can be drawn as dotted or dashed or labelled, but IGNORE solid line DO NOT AWARD mark if diagram contradicts text</p>  <p>3 ACCEPT electrons pulled closer to oxygen atom / water is a dipole 3 IGNORE electronegative / electropositive 3 IGNORE oxygen is negative / hydrogen is positive 3 DO NOT CREDIT ions</p>

Question		Answer	Mark	Guidance
(b)	(ii)	<p>1 medium for (metabolic) <u>reactions</u> ;</p> <p>2 (because) allows (named) ionic compound(s) to separate ;</p> <p>3 <u>transport</u> ;</p> <p>4 two named transport , systems / media OR one example of a transport , medium / system , with a named example of what is transported ;</p> <p>5 (organisms can) absorb / take in , (named) minerals / ions / (named) gas / food ;</p> <p>6 able to <u>dilute</u> toxic substances ;</p>	3 max	<p>1 ACCEPT reactions can happen in water 1 ACCEPT supports metabolic reactions</p> <p>4 IGNORE nutrients 5 ACCEPT apoplast / sap / blood / symplast / vacuolar pathway / blood / lymph / xylem / phloem / tissue fluid / CSF</p> <p>5 IGNORE nutrients / substances 5 IGNORE get / obtain</p> <p>IGNORE refs to osmosis</p>
		Total	10	

Question			Answer	Marks	Guidance
4	(a)	(i)	primary structure ;	1	ACCEPT 1° structure IGNORE polypeptide
	(a)	(ii)	NH ₂ at one end ; COOH at opposite end ; C in centre (of a single amino acid) bonded (separately) to one R and one H ;	3	If R group not shown as 'R' then award max 2 (as general structure asked for in Q) IGNORE labels ACCEPT displayed structure of NH ₂ / HNH ACCEPT displayed structure of COOH if correct double bond shown AWARD only if the candidate has drawn a single 'amino acid' molecule $ \begin{array}{c} \text{H} \\ \\ \text{H}_2\text{N} - \text{C} - \text{COOH} \\ \\ \text{R} \end{array} $
	(b)	(i)	strength / toughness / insolubility ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT strong / tough IGNORE flexible / inelastic IGNORE withstand pressure

Question		Answer	Marks	Guidance
	(b) (ii)		6	One molecule of collagen is 3 polypeptide chains twisted around each other. CREDIT annotated diagrams unless contradicted by text
		1 peptide bonds , between amino acids / in polypeptide ;		
		2 every 3 rd amino acids is , same / glycine ;		2 ACCEPT high proportion of / 35% , glycine / same amino acid
		3 coil / twist / spiral / helix ;		3 CREDIT in context of single polypeptide or 3 polypeptides but DO NOT CREDIT 'α-helix' in the context of a single polypeptide 3 IGNORE wound
		4 left-handed (helix) ;		4 'α-helix, which is left handed' – AWARD mp4 but DO NOT CREDIT mp3
		5 glycine / small R group , allows closeness / twisting (of polypeptide chains) ;		
		6 three polypeptide chains ;		
		7 hydrogen / H , bonds between (polypeptide) chains ;		7 Must be in correct context 7 DO NOT CREDIT H ⁺ / H ₂ bonds
		8 no / few, hydrophilic (R) groups on outside (of molecule) ;		
		9 (adjacent molecules joined by) crosslinks ;		9 ACCEPT covalent bonds between adjacent molecules 9 DO NOT CREDIT in context of bonding between 3 polypeptides 9 IGNORE disulfide
		10 crosslinks / ends of molecules , being staggered ;		
		11 <u>fibril</u> ;		11 IGNORE micro

Question		Answer	Marks	Guidance
(c)	(i)	transport / AW , of, oxygen / O ₂ ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT buffering blood / carrying CO₂ / storing oxygen IGNORE binding oxygen IGNORE Iron</p>
(c)	(ii)	<p><i>haemoglobin (has / is):</i></p> <p>1 globular ;</p> <p>2 hydrophobic (R) groups on inside / hydrophilic (R) groups on outside ;</p> <p>3 4 , chains / sub-units / polypeptides ;</p> <p>4 <i>idea that</i> subunits are (two) different types ;</p> <p>5 α / alpha , helix ;</p> <p>6 <i>idea that</i> proportion of glycine similar to that , of other amino acids / in other proteins ;</p>	3	<p>IGNORE prompt lines – mark as prose but max 2 if an incorrect statement about haemoglobin is given</p> <p>IGNORE statements about collagen even if incorrect, answers must refer to haemoglobin</p> <p>1 IGNORE not fibrous / ball shaped</p> <p>3 IGNORE strands / molecules / proteins 4 ACCEPT in haemoglobin the subunits are not all the same</p> <p>3&4 “two alpha and two beta chains” = 2 marks (mp 3 and 4)</p> <p>5 ACCEPT α-helix</p> <p>6 ACCEPT wide(r) range of amino acids</p> <p>IGNORE refs to Fe (as part of prosthetic group)</p>
		Total	15	