

Human Biology

Advanced Subsidiary GCE

Unit **F221**: Molecules, Blood and Gas Exchange

Mark Scheme for January 2012

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Annotations

Annotation	Meaning
	Correct answer
	Incorrect response
	Benefit of Doubt
	Not Benefit of Doubt
	Error Carried Forward
	Given mark
	Underline (for ambiguous/contradictory wording)
	Omission mark
	Ignore
	Correct response (for a QWC question)
	QWC* mark awarded
	Verbal Construction

Question		Answer	Marks	Guidance
	(ii)	<p><i>process</i> facilitated diffusion OR active transport ;</p> <p><i>two uses</i> respiration ; ATP production ; energy, source / release ; conversion to / stored as, glycogen ;</p>	<p>1</p> <p>1 max</p>	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>Any two uses required for 1 mark.</p> <p>DO NOT CREDIT production of energy DO NOT CREDIT energy store</p>
		Total	7	

Question			Answer	Marks	Guidance
3	(a)	(i)	<p><i>P wave</i> impulses passing through atrial, <u>wall</u> / <u>muscle</u> ; atria contract / atrial systole ; blood passes, through AV valves / into ventricles ;</p> <p><i>QRS complex</i> impulses passing through ventricular, <u>wall</u> / <u>muscle</u> ; ventricles contract / ventricular systole ; AV valves shut / semi-lunar valves open ; blood, leaves ventricles / enters (named) arteries ; 3 max</p>	4 max	<p>DO NOT CREDIT signal or messages DO NOT CREDIT hybrid terms e.g. arterial systole</p> <p>ACCEPT impulses passing through Purkyne Fibres</p> <p>ACCEPT leaves heart</p>
		(ii)	68 to 73 ; ;	2	<p>Correct answer = 2 marks</p> <p>If answer incorrect or not given to the nearest whole number, then ALLOW 1 mark for correctly showing calculation e.g. $60 \div 0.84$</p>
	(b)	(i)	(trace) D ;	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
		(ii)	(trace) C ;	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
		(iii)	(trace) C ;	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

Question		Answer	Marks	Guidance
	(c) (i)	Y stroke volume ; Z cardiac output ;	2	Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks IGNORE SV IGNORE CO
	(ii)	(heart) muscle <u>contracts</u> more strongly ; (heart) muscle / wall, of left ventricle thickens ;	1 max	IGNORE ref to volume of blood being pumped out (as given in Q) ACCEPT hypertrophy
Total			12	

Question		Answer	Marks	Guidance
4	(a)	<p><i>Award marking points in any order</i></p> <p>amino / amine (group) ; carboxyl / carboxylic (group) ;</p>	2	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>DO NOT CREDIT chemical symbols alone e.g. COOH</p> <p>ACCEPT carboxylic acid group</p>
	(b) (i)	<p><i>award marks on diagram as follows</i></p> <p>H removed from amino group from one amino acid ; OH removed from carboxylic group of other amino acid ;</p> <p>removal of, water / H₂O ;</p> <p>correct bond shown between two amino acids ;</p>	3 max	<p>i.e.</p> $\begin{array}{c} \text{O} \quad \text{H} \\ \quad \\ -\text{C}-\text{N}- \end{array}$
	(ii)	<p>peptide ;</p>	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 covalent</p>

Question		Answer	Marks	Guidance						
	(c)	<p>hydrogen bonds ; disulfide bonds ; ionic bonds ; hydrophobic / hydrophilic, interactions ; 2 max</p> <p>further detail of named bond ;</p> <p>(bonds / interactions) maintain tertiary structure ; <i>idea that</i> (bonds / interactions) maintain , folding / coiling / AW , of the structure ;</p>	4 max	<p>IGNORE ref to secondary structure</p> <p>ACCEPT Van der Waal's forces</p> <p>e.g. (hydrogen bond) between partially charged atoms (disulfide bond) between sulfur atoms or cysteines (ionic bond) between charged atoms (hydrophobic or hydrophilic interactions) between nonpolar or polar regions</p>						
		<p>QWC ~ technical terms used in correct context and correctly spelt ;</p>	1	<p>2 terms from:</p> <table style="width: 100%; text-align: center;"> <tr> <td>hydrogen</td> <td>disulfide</td> <td>ionic</td> </tr> <tr> <td>hydrophobic</td> <td>hydrophilic</td> <td>tertiary</td> </tr> </table>	hydrogen	disulfide	ionic	hydrophobic	hydrophilic	tertiary
hydrogen	disulfide	ionic								
hydrophobic	hydrophilic	tertiary								
Total			11							

Question		Answer	Marks	Guidance	
6	(a)	biconcave ; organelle(s) ; nucleus ; haemoglobin ; diffusion ;	5	Mark the first answer in each gap. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT membrane-bound organelle(s) ACCEPT passive or simple diffusion DO NOT CREDIT facilitated diffusion	
	(b)	(i)	(as diameter of the cell increases) the SA: Vol decreases ; comparative figs. (for leucocyte <u>and</u> erythrocyte) ;	2	to include diameter with units <u>and</u> SA:Vol for both cell types
		(ii)	erythrocyte is, not spherical / not a sphere / biconcave ; a biconcave shape increases surface area <u>and</u> decreases volume ; using a sphere for calculating gives smaller value of SA:Vol ; <i>idea that</i> a different, calculation / formula, would be needed (for a biconcave shape) ;	2 max	CREDIT ora

Question		Answer	Marks	Guidance
	(b) (iii)	<p><i>Look for the idea of</i></p> <p>smaller surface area : volume ratio ; (so) less exchange of gases / AW ;</p> <p>less flexible ; (so) unable to pass through capillaries ;</p> <p>AVP ; AVP ;</p>	2 max	<p>ACCEPT ora throughout</p> <p>e.g. less oxygen available to cells for respiration more anaerobic respiration spherocytes recognised as damaged spherocytes more easily damaged spherocytes (constantly) broken down (in spleen)</p>
		Total	11	

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