OCR
RECOGNISING ACHIEVEMENT

GCE

Human Biology

Advanced GCE **A2 H423**

Advanced Subsidiary GCE **AS H023**

Mark Schemes for the Units

January 2009

H023/H423/MS/R/09J

Oxford Cambridge and RSA Examinations

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Advanced GCE Human Biology (H423)

Advanced Subsidiary GCE Human Biology (H023)

MARK SCHEME FOR THE UNITS

F221

Question			Expected Answers	Marks	Additional Guidance
1	(a)		*differences* no cell wall v. cell wall **;** no chloroplast v. chloroplast **;** no <u>large / permanent</u> vacuole v. <u>large / permanent</u> vacuole **;** no centriole / centriole **;** *2 max* *similarities* cytoskeleton / cytoplasm**;** vesicles **;** nucleus / nuclear membrane / nucleolus **;** (cell surface / plasma) membrane **;** smooth endoplasmic reticulum **;** rough endoplasmic reticulum **;** (same size) ribosomes **;** mitochondria **;** golgi **;** *2 max*	**4 max**	Need to complete both columns Both 'sides' must be correct for each mark point **DO NOT CREDIT** for references to function **DO NOT CREDIT** ref. to chlorophyll Must have large or permanent implied in the row **CREDIT** SER **CREDIT** RER
	(b)		**A** packages / modifies / AW, proteins (for secretion or use within cell) **;** **B** contains the genetic code for the protein / produces ribosomes **;** **C** produces the protein / transports protein / produces vesicles **;**	**3**	**ACCEPT** "instructions for making proteins" **DO NOT CREDIT** "contains genetic information" on its own **CREDIT** correct reference to messenger RNA linked to protein synthesis

Question			Expected Answers	Marks	Additional Guidance
	(c)				Must **link** feature to how it helps function
			biconcave / large surface area to volume ratio, for maximum rate of **diffusion** / **absorption** / gas exchange **;**		**DO NOT CREDIT** concave , must use term **bi**concave
			haemoglobin for transport of oxygen **;**		
			few **organelles** / no **nucleus**, allow it to take on, flat / thin/ biconcave shape **;**		**ACCEPT** reference to loss of nucleus to enable a greater <u>volume</u> for haemoglobin **DO NOT CREDIT** ref. to lack of nucleus to enable carrying more oxygen
			small size / flexible, to squeeze through **capillaries** / to press against **;**	**2 max**	
			QWC **;**	**1**	Two terms used and spelt correctly from the emboldened terms
			Total	**10**	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td>1 mark per row

<table>
<tr><th rowspan="2">molecule</th><th colspan="5">element</th></tr>
<tr><th>carbon</th><th>hydrogen</th><th>nitrogen</th><th>oxygen</th><th>phosphorus</th></tr>
<tr><td>amino acid</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>glycogen</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>monosaccharide</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>phospholipid</td><td>✓</td><td>✓</td><td></td><td>✓</td><td>✓</td></tr>
</table>
;
;
;
;</td><td>4</td><td>DO NOT CREDIT any hybrid combinations of ticks/crosses in the same box</td></tr>
<tr><td></td><td>(b)</td><td></td><td>facilitated diffusion / active transport / co-transport ;</td><td>1</td><td>DO NOT CREDIT diffusion or simple diffusion</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>peptide bond ;
condensation reaction / removal of a molecule of water ;

QWC ;</td><td>2

1</td><td>DO NOT CREDIT dipeptide bond

Both emboldened terms used and spelt correctly</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>changes tertiary structure of enzyme ;
changes shape of, enzyme / active site ;
substrate cannot, fit into active site / bond with active site / form enzyme substrate complex ;

AVP ;</td><td>2 max</td><td>CREDIT forms ESC
DO NOT CREDIT third mark point if candidate refers to or describes competitive inhibition / blocking of active site

e.g. non-competitive inhibitor , correct reference to allostery
DO NOT CREDIT competitive inhibitor</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>10</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
3	(a)	1 2 3 4 5 6 7 8 9	get patient to, sit / lie down / AW ; put on (sterile) gloves ; leave glass in wound / AW ; use (clean) cloth / AW, to apply pressure ; press at sides of wound / not directly on top of glass / AW ; if blood soaks through don't remove pad put another on top / AW ; raise arm ; maintain pressure ; make sure blood flow not cut off ;	4 max	**CREDIT** elevate legs **CREDIT** linked mark points e.g. "create ring around the wound with bandages and apply pressure on the ring" would match MP4 and MP5
	(b)		she had lost a lot of blood ; blood is more than just red cells / other named component of blood / AW ; needed to restore (blood) volume (quickly) ; to maintain blood pressure ;	3	**ACCEPT** has lost other main components of blood so needs to replace them
	(c)		to prevent blood clotting ; calcium is a cofactor (needed for enzyme action) ; lack of calcium prevents, conversion of prothrombin to thrombin / activation of prothrombin ;	2	**CREDIT** reverse argument throughout e.g. calcium ions are needed for blood clotting **DO NOT CREDIT** co-enzyme
			Total	9	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		**D** aorta **;** **E** pulmonary artery **;** **F** right ventricle **;** **G** right atrium **;** **H** vena cava **;**	**5**	**ACCEPT** phonetic spelling throughout
	(b)	**(i)**	**J** aortic / semi-lunar valve, opens **;** **K** atrio-ventricular / AV / bicuspid, valve opens **;**	**2**	**ACCEPT** blood starts to flow into aorta **ACCEPT** blood starts to flow into (left) ventricle **DO NOT CREDIT** blood starts to flow into <u>right</u> ventricle
		(ii)	lower blood pressures **;** *1 mark* in pulmonary circuit / (blood) only travels to the lungs**;** right (ventricle) has, thinner wall / less muscle **;** blood does not have to, overcome as much resistance / travel as far to travel **;** *2 max*	**3 max**	If wrong answer is given for pressure difference no marks can be awarded. **ACCEPT** reverse argument e.g. in systemic circuit LV has more muscle as blood has to overcome higher resistance to blood flow / travel further
		(iii)	blood flows into (left atrium from pulmonary vein) / AW **;**	**1**	**ACCEPT** "it is filling with blood"
	(c)	**(i)**	18542 **; ;**	**2**	correct answer = 2 marks if answer incorrect then allow 1 mark for working i.e. 127 x 146

Question			Expected Answers	Marks	Additional Guidance
		(ii)	(although David) has a higher heart rate **;** Sam, has a higher stroke volume / expels more blood from the heart with each beat **;** heart muscle/ left ventricle, increased in, size / thickness **;** (left) ventricle contracts more forcefully **;** cardiac output depends upon stroke volume and heart rate / CO = SV x HR / Q = SV x HR **;** comparative data quote **;**	**2 max**	**CREDIT** 'Q' for cardiac output (CO) **ACCEPT** reverse argument throughout e.g. Sam has a lower heart rate... **ACCEPT** correct reference to Starling's Law Figures / equation must be given for **both** David and Sam e.g. Sam CO / Q = 55 x 98 David CO / Q = 76 x 70
			Total	**15**	

Question			Expected Answers	Marks	Additional Guidance
5			ciliated ; surface area ; two ; diffusion ; elastic ; recoil ; surfactant ;	7	If an answer has been crossed out and not replaced then mark answer that is crossed out. If an answer has been crossed out and a different answer given, the uncrossed answer must be marked even if this is incorrect and the correct answer has been crossed out.
			Total	**7**	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>
<table>
<tr><th>feature</th><th>explanation</th></tr>
<tr><td>narrow / small, diameter / only 8 μm / AW ;</td><td>brings blood as close as possible to cells / slows down flow / speeds up transfer of substances ;</td></tr>
<tr><td>thin wall / wall a single layer of cells ;</td><td>short distance for diffusion / allows rapid diffusion / speeds up transfer of substances ;</td></tr>
<tr><td>smooth inner surface ;</td><td>smooth flow / reduces friction ;</td></tr>
<tr><td>pores / fenestrations / AW ;</td><td>allows easy movement of substances / speeds up transfer of substances ;</td></tr>
<tr><td>large total surface area / AW ;</td><td>fast rate of exchange (of substances) / AW ;</td></tr>
</table>
</td><td>6 max</td><td>CREDIT the feature first. Then, mark a <u>correct</u> explanation for that feature.

CREDIT feature if in explanation column

ACCEPT: named substance instead of substances (oxygen, carbon dioxide, nutrients, glucose, urea)

DO NOT CREDIT mark for explanation on its own or linked to an incorrect feature

ACCEPT correct explanation for a poorly described feature e.g.
feature = thin Λ (not credited)
explanation = short diffusion distance (credit)

feature = large Λ surface area (not credited)
explanation = fast rate of exchange (credit)

ACCEPT ‘gaps’ instead of pores

ACCEPT ‘no cell is very far from a capillary’ or ‘extensive network’</td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
	(b)	**(i)**	**L,** because it has a lower, (HP) / (hydrostatic) pressure **;**	**1**	**DO NOT CREDIT** L alone **ACCEPT** L and a reason for why it can not be M e.g. 'pressure higher at arterial end'
		(ii)	(skeletal) muscles (in legs) not contracting as much around veins **;** blood flow in veins, slows down / becomes sluggish **;** hydrostatic pressure of blood increased at venous end of capillary **;** (so) less tissue fluid reabsorbed / more tissue fluid remains in tissues (causing swelling) **;**	**2 max**	**ACCEPT** 'blood pooling in veins' **DO NOT CREDIT** 'circulation slows / poor / sluggish' **ACCEPT** 'build up of tissue fluid'
			Total	**9**	

Grade Thresholds

Advanced Subsidiary GCE Human Biology (H023)
January 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
F221	Raw	60	50	44	39	34	29	0
	UMS	90	72	63	54	45	36	0

Specification Aggregation Results

The first AS aggregation for this specification will be in June 2009.

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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