OCR
Oxford Cambridge and RSA

GCE

Human Biology

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

Advanced Subsidiary GCE

Mark Scheme for June 2015

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning of annotation
	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

Question			Answer	Mark	Guidance
1	(a)	(i)	**A** methyl / CH_3 **;** **B** carboxyl (group) / carboxylic (acid) / COOH **;**	2	**CREDIT A** and **B** given in either order
		(ii)	glycerol **;**	1	
	(b)	(i)	dissolved in plasma **OR** in solution in plasma **;**	1	**ACCEPT** in plasma because (glucose) is polar
		(ii)	*idea that* (glucose) is easily broken down (by cells) **;** (to) produce ATP / release energy **;**	2	
	(c)		reference to sterile conditions **;** *idea that* the meter should be calibrated **;** safe disposal of test strip **;**	2 max	**CREDIT** description e.g. swab skin with alcohol use of sterile lancet **CREDIT** description of meter function **ACCEPT** safe disposal of e.g. lancet
	(d)	(i)	glucose is converted to gluconolactone **;** by glucose oxidase **;**	2	**CREDIT** glucose dehydrogenase
		(ii)	time of day the blood sample is taken **;** exercise before testing **;** food / drink , before testing **;** insulin has been used before testing **;**	2 max	**IGNORE** ref. to glucagon administration
			Total	**12**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th colspan="2">Mark</th><th>Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td>
<table>
<tr><th>statement</th><th>applies to procedure for minor blood loss</th><th>applies to procedure for excessive blood loss</th><th>applies to both procedures</th><th>does not apply to either of the procedures</th></tr>
<tr><td>Call emergency helpline for an ambulance</td><td></td><td>√</td><td></td><td></td></tr>
<tr><td>Place a clean dressing over the wound</td><td></td><td></td><td>√</td><td></td></tr>
<tr><td>Give the patient a painkiller such as aspirin</td><td></td><td></td><td></td><td>√</td></tr>
<tr><td>Raise the injured limb above the level of the heart</td><td></td><td>√</td><td></td><td></td></tr>
</table>
</td><td>;
;
;
;</td><td>4</td><td></td></tr>
</table>

Question	Answer	Mark	Guidance	Question	Answer
2	**(b)**	**(ii)**	bone marrow failure **OR** leukaemia **OR** correctly named platelet disorder **;**	1	**ACCEPT** after surgical procedures or chemotherapy
	(c)		**1 leuco-depleted** blood **AND** (most) **leucocyte**(s) have been removed from the blood / AW **;** **2** packed , red cells / erythrocyte(s) **AND** red blood cells separated from rest of the blood / AW **;** **3 clotting factors AND** processed from plasma / AW **;** **4** (fresh frozen) **plasma AND** all cells have been removed / AW **;** **5** AVP **;**	3 max	**CREDIT** for **one** mark any named blood product **AND** the description e.g. serum **AND** clotting factors removed
			QWC **;**	1	**Two** of the following terms, used in the appropriate context with correct spelling: **leuco-depleted leucocyte** **clotting factors plasma**
			Total	**11**	

Question			Answer	Mark	Guidance
3	(a)	(i)	condensation reaction **/** removal of water molecule **;** glycosidic links formed **;** (α)1-4 links **;**	3	**CREDIT** correctly annotated diagram
		(ii)	(enzymes are) globular proteins **;** (enzymes have) tertiary structure **/** specific 3D shape **;** (enzymes have) active site which has complementary shape to substrate **;**	3	**ACCEPT** active site is complementary to glycogen or glucose or UDP-glucose
	(b)		*idea that* the glycogen deposited is , in long chains / not branched , so not compact (which damages liver cells) **;** *idea that* glucose , is in excess / remains in cells , so lowers water potential (which damages liver cells) **;**	1 max	
			Total	**7**	

Question			Answer	Mark	Guidance
4	(a)		(humans are) large / multicellular , organisms **;** (humans have) low SA:Vol **;** *idea of* a longer diffusion distance (so) substances needed could not be supplied quickly enough **;**	2 max	**ACCEPT** humans have many cells
	(b)	(i)	brachial artery **;**	1	
		(ii)	**F ;**	1	
		(iii)	**G ;**	1	
		(iv)	**G ;**	1	
		(v)	120/70 (mmHg) **;**	1	
	(c)		force of ventricular contractions **;** strength of elastic recoil (of blood vessels) **;** resistance to blood flow / AW **;**	2 max	**ACCEPT** lumen diameter of blood vessels qualified e.g. narrower lumen would increase pressure **CREDIT** *idea of* vasodilation or vasoconstriction occurring **IGNORE** reference to cardiovascular disease
			Total	**9**	

Question			Answer	Mark	Guidance
5	(a)		**1** many alveoli provide a large surface area / alveoli are folded to increase surface area **;** **2 squamous** / **epithelial** , cells are , thin / only 0.1 - 0.5 μm thick **;** **3 capillary** / alveolar , wall is only one cell thick **;** **4** thin , cells / wall , allows shorter **diffusion** pathway (for gases) **;** **5** *idea of* dense capillary network around alveoli **;**	4 max	**IGNORE** reference to mucus or surfactant
			QWC **;**	1	**Two** of the following terms, used in the appropriate context with correct spelling: **squamous** **capillary** **diffusion** **epithelial**
	(b)	**(i)**	0.3 (mm) **;;**	2	Award **one** mark for: answer given to two decimal places i.e. 0.31 / 0.32 / 0.33 or correct working e.g. $\frac{3.1\text{ cm}}{100}$ or $\frac{31\text{ mm}}{100}$
		(ii)	*idea that* fewer / larger , alveoli so less surface area **OR** walls of alveoli are thicker so increased diffusion distance **;** (so) less gas exchange (which increases breathing rate) **;**	2	**CREDIT** ORA **CREDIT** less oxygen or more carbon dioxide in blood

Question			Answer	Mark	Guidance
5	(b)	(iii)	spirometer **;** *1 mark* *idea that* one deep breath in and then one full expiration **;** *idea that* the height of the peak and trough of the trace (produced) shows vital capacity **;** AVP **;** *2 max*	3 max	**CREDIT** reverse e.g. one full breath out and then one deep breath in e.g. results recorded on a rotating drum or kymograph or data logger
			Total	**12**	

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<tr><td>6</td><td>(a)</td><td></td><td>
<table>
<tr><th>statement</th><th>True (T) or False (F)</th></tr>
<tr><td>ions found in blood plasma are known as electrolytes</td><td>T</td></tr>
<tr><td>increasing the concentration of ions in the blood increases the water potential of plasma</td><td>F</td></tr>
<tr><td>the concentration of ions in the blood can be measured using a haemocytometer</td><td>F</td></tr>
<tr><td>ions can be transported across cell membranes by facilitated diffusion</td><td>T</td></tr>
</table>
;;;</td><td>3</td><td>All correct for 3 marks
3 correct for 2 marks
2 correct for 1 mark</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>(venom) increases permeability / AW (of cell membrane) ;
(so) potassium ions diffuse out of cell ;

AVP ;;</td><td>2 max</td><td>

ACCEPT well-reasoned argument e.g.
sodium-potassium pumps may stop working
(so) no active transport of potassium ions</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>(loss of potassium ions) increases
water potential inside the cell ;
water leaves cell by osmosis ;
cell , crenates / shrivels ;
idea that cell metabolism is affected ;</td><td>2 max</td><td>CREDIT ORA</td></tr>
</table>

Question			Answer	Mark	Guidance
	(c)		*For hypokalaemia trace* **1** P wave is (slightly) taller / AW **;** **2** interval between P and Q(RS) is bigger / AW **;** **3** Q / R , smaller / AW **;** **4** S(T) depression elongated / AW **;** **5** T wave is not clear **/** AW **;**	2 max	**CREDIT** ORA **IGNORE** explanations for differences
			Total	**9**	

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