OCR
RECOGNISING ACHIEVEMENT

GCE

Human Biology

Advanced Subsidiary GCE

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

Mark Scheme for June 2012

Oxford Cambridge and RSA Examinations

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Annotations used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

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

**Quality of Written Communication*

Question			Answer	Marks	Guidance
1	(a)		group of <u>specialised</u> cells **;** group of (similar) cells that carry out a function **;**	1 max	
	(b)	(i)	fibrinogen / prothrombin / urea **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks **ACCEPT** phonetic spelling
		(ii)	fibrinogen **and** prothrombin **;**	1	**Mark the first 2 answers**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks **BOTH** needed for the mark to be awarded **ACCEPT** phonetic spelling
		(iii)	lymphocyte **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks **ACCEPT** phonetic spelling

Question			Answer	Marks	Guidance
	(c)		*damaged tissue* *idea that* it activates or attracts platelets **OR** (to) release thromboplastin **OR** exposed collagen releases chemicals **;** *platelets* *idea of* clumping together to form **,** plug / barrier **OR** release thromboplastin **;** *fibrin* forms **,** mesh / tangles / network **OR** traps blood cells **;**	3	**ONLY CREDIT** reference to **thromboplastin** once if not already credited for damaged tissue **IGNORE** scab (as produced at later stage) **IGNORE** platelets
	(d)		(thrombin) active site has **,** specific / particular / certain / complementary / AW **,** shape **;** only **,** <u>fibrinogen</u> can fit (active site) **;**	2	the idea of shape must be stated and suitably qualified idea that active site is specific to fibrinogen
	(e)		**1** heparin is similar shape to substrate / AW **;** **2** (may) fit the active site / AW **;** **3** heparin may prevent substrate binding with active site / AW **;** **4** AVP **;**	2 max	1 **DO NOT CREDIT** same shape 4 e.g. (may) change the shape of the **,** enzyme / active site (may) act as competitive inhibitor
			Total	**11**	

Question			Answer	Marks	Guidance
2	(a)		**1** nose sealed / use of noseclip / only breathing through mouth **;** **2** person breathes in **and** out through mouthpiece **;** **3** *idea of* container of **,** air **/** oxygen / medical grade oxygen **,** floating in tank of water **;** **4** movement (of chamber or trace) is **,** down when breathing in / up when breathing out **;** **5** movements (of chamber) recorded on **,** graph paper / rotating drum **/** kymograph **;** **6** rise and fall of trace can show **,** tidal volume / volume of air breathed in and out **;** **7** AVP **;**	4 max	**ACCEPT** peaks and troughs for rise and fall of trace *7* e.g. (CO_2 absorber is) soda lime disinfect mouthpiece safety consideration (asthma)
	(b)		age **;** gender **;** health of lungs / asthma **;** amount of exercise / level of fitness **;**	2 max	**Mark the first 2 answers**. **CREDIT** a condition that would affect lung volume e.g. smoking / emphysema / bronchitis / cystic fibrosis
	(c)	(i)	10.5 **;** breaths per minute **;**	2	**ACCEPT** answer in range 10 - 11

Question			Answer	Marks	Guidance
		(ii)	normal breathing at start / AW **;** (took) one deep breath in / AW **;** (then) forced exhalation ***/*** breathed out hard / AW **;** returns to original breathing / AW **;** AVP **;**	3 max	e.g. breathing rate slows slightly before deep breath correct reference to vital capacity
		(iii)	*idea that* (between X and Y) trace will have steeper downward slope **;** *idea that* greater amplitude / peaks and troughs of trace will be greater **;** *idea that* greater frequency / increased breaths per minute / increased breathing rate **;**	2 max	**ACCEPT** peaks **or** troughs will be greater
			Total	**13**	

Question			Answer	Marks	Guidance
3	(a)		*presence of* glycoprotein(s) **OR** carbohydrate chains **OR** sugar residues **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks **IGNORE** glycolipid
	(b)		*membrane system* Golgi (body / apparatus) **;** *role* modification / packaging **,** of proteins **or** formation of **,** (secretory) vesicles / lysosomes **;** **OR** *membrane system* smooth endoplasmic reticulum / SER / smooth ER **;** *role* synthesis / transport **,** of **,** lipids / steroids **;** **OR** *membrane system* nuclear **,** envelope / membrane **;** *role* *idea that* regulates exchange between nucleus and cytoplasm **;**	2	**Mark the first answer for membrane system** but if a further answer is given that is incorrect or contradicts the correct answer then do not award the mark. Role must be correctly linked to the stated membrane system for the role marking point. **DO NOT CREDIT** vesicles If vesicles are stated as membrane system credit role of vesicles for 1 mark max

Question	Answer	Marks	Guidance
(c)	**1** **channel** protein(s) **;** **2** (used for) **facilitated diffusion ,** is **passive** / does not use ATP / does not use energy **;** **3** (channel) protein(s) have **hydrophilic** lining **;** **4** transports substances **,** down concentration gradient / from high to low concentration **;** **5** **carrier** protein(s) **;** **6** change shape when molecule binds **;** **7** **active transport** uses **,** ATP / energy **;** **8** transport substances **,** against concentration gradient / from low to high concentration **;** **9** AVP **;**	4 max	*3* **ACCEPT** description e.g. allows polar molecules to pass through *4* **DO NOT CREDIT** 'with gradient' unless qualified *5* **CREDIT** in facilitated diffusion **or** active transport *6* **CREDIT** in facilitated diffusion **or** active transport *9* e.g. sodium-potassium pump glucose transported by facilitated diffusion ions transported by active transport ref. to cotransport ref. to intrinsic or extrinsic proteins
	QWC **;**	1	**Two** of the following terms, used in the appropriate context with correct spelling: **facilitated diffusion** **passive** **channel** **hydrophilic** **carrier** **active transport**

Question			Answer	Marks	Guidance
	(d)		*idea that* ions **,** remain in / not removed from **,** blood **;** water moves into blood by osmosis **;** no / less **,** facilitated diffusion / active transport **,** of soluble molecules / ions **;**	1 max	**ACCEPT** soluble substances in place of ions
			Total	**9**	

Question			Answer	Marks	Guidance
4	(a)		sphygmomanometer **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks **ACCEPT** phonetic spelling
	(b)		exercise increases blood pressure **;** *idea of* to establish **,** base line / value for comparison **;**	1 max	**IGNORE** effect of **,** stress / fear / adrenaline **IGNORE** reference to resting level
	(c)		pressure in the artery **;** when (left) ventricle is contracting **;**	2	**DO NOT CREDIT** aorta
	(d)	(i)	systolic (upper) value must be between 140-190 **AND** diastolic (lower) value must be between 90-100 **;**	1	i.e. value between 140/90 and 190/100
		(ii)	systolic (upper) value must be between 70-90 **AND** diastolic (lower) value must be between 40-60 **;**	1	i.e. value between 70/40 and 90/60
			Total	**6**	

Question			Answer	Marks	Guidance
5	(a)		Human Immunodeficiency Virus / HIV **;** Hepatitis C / Hep. C **;** CMV / cytomegalovirus **;**	1 max	**DO NOT CREDIT** other forms of hepatitis or hepatitis alone (without qualification)
	(b)		recently had surgery **;** illness / on medication **;** recently been in contact with infectious disease **;** pregnant **;** have jaundice **;** recently had **,** acupuncture / tattoo / piercings **;** recently travelled to a country with malaria **;** AVP **; ;**	2 max	**Mark the first 2 answers**. e.g. anaemia ignore cold sore e.g. had a blood transfusion recently donated blood underweight
	(c)	(i)	packed red cells used for **,** anaemia / blood loss due to surgery / blood loss after childbirth ***/*** after severe loss of blood **;** platelets used for **,** bone marrow disease / leukaemia / after transplants / during chemotherapy / liver cirrhosis **;**	2	Component **and** correct use must be stated for the mark. **IGNORE** transfusion **ACCEPT** low erythrocyte or low RBC count
		(ii)	*idea of* increased enzyme activity **;** so cannot be stored for long periods **;**	2	

Question			Answer	Marks	Guidance
		(iii)	expiry date **;** Rhesus factor (positive or negative) **;** AVP **;**	2 max	**IGNORE** anticoagulants / volume of blood / age / gender e.g. date blood taken place of donor session
			Total	**9**	

Question			Answer	Marks	Guidance
6	(a)		named carbohydrate **;** glucose used as**,** respiratory substrate / energy source **;** energy released when broken down / can be used to produce ATP **;** glycogen can act as energy store **;** (easily stored because) insoluble / branched / compact **;** glycoproteins are involved in cell recognition **;** glycoproteins can assist with cell adhesion **;** ribose / deoxyribose **,** used in formation of nucleotides **;**	3 max	**ACCEPT** glycogen used to store glucose
	(b)		made of (two) **monosaccharide**(s) **;** joined by a **glycosidic** bond **;** during a **condensation** reaction **;** (molecule of) water removed **;**	3 max	**CREDIT** marks from a labelled / annotated diagram **ACCEPT** named monosaccharides
			QWC ;	1	**Two** of the following terms, used in the appropriate context with correct spelling: **monosaccharide condensation glycosidic**
	(c)		soluble **;** decreases / lowers **;** higher / greater **;** water **;** osmosis **;**	5	**Mark the first answer on each prompt line.** If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks **ACCEPT** dissolved
			Total	**12**	

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