OCR
RECOGNISING ACHIEVEMENT

GCE

Human Biology

Advanced Subsidiary GCE

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

Mark Scheme for January 2013

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.

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

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

**Quality of Written Communication*

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	haemoglobin **OR** thrombin **OR** fibrinogen **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks
		(ii)	triglyceride **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks
		(iii)	glycogen **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks
		(iv)	glycogen **OR** triglyceride **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks

Question			Expected Answers	Marks	Additional Guidance
1	(b)	(i)	**1** form a bilayer **;** **2** hydrophobic tails / fatty acid (chains) **,** on inside (of membrane) **;** **3** hydrophilic / phosphate **,** heads to outside (of membrane) **;**	2	**ACCEPT** annotated diagram of bilayer of phospholipids **ACCEPT** hydrophilic or phosphate heads in contact with cytoplasm <u>and</u> tissue fluid
		(ii)	**1** molecules in the membrane are able to move **;** **2** *idea that* there are different **,** types of / named **,** molecule(s) **;**	2	**1** **DO NOT CREDIT** 'fluid' or 'flow' **2** **ACCEPT** *idea that* molecules are scattered
			Total	**8**	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	**A** pulmonary artery **;** **B** vena cava **;** **C** aorta **;** **D** pulmonary vein **;**	4	**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** phonetic spelling as long as it is unambiguous **C DO NOT CREDIT** 'artery'
		(ii)	provides the **,** cardiac <u>muscle</u> / <u>myocardium</u> **,** with **,** oxygen / glucose / nutrients **;**	1	**ACCEPT** 'heart <u>muscle</u>' **DO NOT CREDIT** 'wall of heart'

Question	Expected Answers	Marks	Additional Guidance
2 (b)	*during relaxation* **1** **diastole** / heart muscle is relaxed **;** **2** atria / ventricles **,** fill with blood **;** **3** **semi**-**lunar** valves are closed <u>and</u> **atrioventricular** valves are open **;** *during contraction* **4** atrial **systole** / atria contract **;** **5** blood forced (from atria) into ventricles **;** **6** ventricular systole / ventricles contract **;** **7** atrioventricular valves forced shut <u>and</u> semi-lunar valves open **;** **8** blood forced **,** out of ventricles / into aorta <u>and</u> pulmonary artery **;** *3 max for during contraction*	4	**Marking points must only be credited if in sequence rather than being 'free-standing'. Sequence may start from any point in the cycle.** **DO NOT CREDIT** responses that describe right and left sides of the heart in separate cycles (as the question states 'during one heart beat') **ACCEPT** *idea that* pressure is required for blood to move eg 'pumped' or 'pushed'
	QWC **;**	1	**Two** of the following terms, used in the appropriate context with correct spelling: **diastole** **semi-lunar** **atrioventricular** **systole**
	Total	**10**	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	put on sterile gloves **;** check wound for objects / if anything is in the wound do not remove it **;** AVP **;**	2	**Mark the first answer in each of the first two statements**. **IGNORE** 'ring 999' or alternative similar suggestion **IGNORE** general statements relating to well-being of patients (as Q refers to preventing blood loss) eg place a ring or pad around object in wound apply pressure to sides of wound
		(ii)	*idea that* clot may be beginning to form under the pad / not wanting to disturb the clotting process **;**	1	
	(b)	(i)	(x) 5000 **;;**	2	**Correct answer = 2 marks** If units are stated (eg mm), then award **max 1** If the answer is incorrect, **CREDIT** 1 mark for working $\frac{40mm}{8\mu m}$ or $\frac{40000}{8}$ or $\frac{4cm}{8\mu m}$ If the answer is not given to the nearest whole number **CREDIT** 1 mark for a correctly calculated unrounded answer
		(ii)	fibrin **;**	1	**Mark the first answer**. If a further answer is given that is incorrect or contradicts the correct answer then = 0 marks

Question			Expected Answers	Marks	Additional Guidance
		(iii)	*primary* sequence / order **,** of amino acids in polypeptide (chain) **;** *secondary* twisting / folding **,** of the polypeptide chain into **,** alpha helix / beta-pleated sheet **;**	2	**DO NOT CREDIT** 'the amino acids in the chain' without ref to the idea of sequence **ACCEPT** 'coiling' of polypeptide chain into alpha helix or beta-pleated sheet
	(c)		*bandages could* **1** (have chemicals that) attract platelets **;** **2** contain **,** calcium ions / Ca^{2+} **;** **3** (have chemicals that) increase enzyme activity **;** **4** contain cofactors **;** **5** AVP **;**	1	**1 ACCEPT** eg chemicals that make platelets sticky trigger more platelets **2 DO NOT CREDIT** calcium or Ca^{+} **5** eg contains both thrombin and fibrinogen eg contain inhibitors of the enzymes that break down blood clots
			Total	**9**	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		goblet **;** ciliated **;** ribosomes / rough endoplasmic reticulum / RER **;** vesicles **;** Golgi (apparatus / body) **;** carbohydrate(s) **;** exocytosis **;**	7	**DO NOT CREDIT** 'cilia' **ACCEPT** 'polysaccharide' **IGNORE** 'glycogen' or 'glucose'
	(b)	(i)	coordinated / rhythmic **,** beating of cilia **;** move / waft (mucus and bacteria) **,** upwards **;**	2	**DO NOT CREDIT** 'cilia move back and forth' **ACCEPT** move or waft (mucus and bacteria) towards the mouth
		(ii)	**1** by <u>osmosis</u> **;** **2** down a water potential gradient / from a high(er) water potential to a low(er) water potential **;** **3** across the **,** cell <u>surface</u> / plasma **,** membrane **;** **4** AVP **;**	3	**2 DO NOT CREDIT** 'along a gradient' or 'with the gradient' **DO NOT CREDIT** 'concentration of water' **4** eg through aquaporins
			Total	**12**	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		tie a band / **tourniquet ,** around the arm above the elbow **;** clean area with **, alcohol** / **antiseptic ;** using a **, sterile / sterilised ,** needle **;** (take blood) from a **vein ;**	3	
			QWC **;**	1	**Two** of the following terms, used in the appropriate context with correct spelling: **tourniquet** **alcohol** **antiseptic** **sterile / sterilised** **vein**
	(b)	(i)	**X** neutrophil **;** **Y** lymphocyte **;**	2	**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** phonetic spelling as long as it is unambiguous **X** **DO NOT CREDIT** phagocyte (as this describes the function)
		(ii)	contain enzymes **;** for digestion of **,** pathogen(s) / bacteria **;** AVP **;**	2	eg ref to involvement of non specific immune response

Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	haemocytometer **;**	1	**ACCEPT** phonetic spelling as long as it is unambiguous
		(ii)	*dilution factor is changed to 1 in 20* (smaller dilution factor as) there are fewer leucocytes **;** *a different diluting fluid is used* leucocytes remain intact / <u>only</u> bursts the erythrocytes **;** *a stain is added* so leucocytes can be seen <u>and</u> identified **;**	3	**ACCEPT** nuclei are stained for identification of leucocytes
			Total	**12**	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		find **,** radial artery / artery in wrist / artery in neck **;** using two fingers press down on artery **;** count the number of pulses in one minute **;**	3	**CREDIT** number of pulses in 30 seconds then multiply by 2 or 15 seconds then multiply by 4
	(b)	(i)	pulse rate **AND** beats min^{-1} **;**	1	**ACCEPT** heart rate **ACCEPT** beats per minute / BPM / bpm
		(ii)	bar drawn on graph **AND** to the right of the third bar **AND** bar shaded **AND** value between 85 and 100 **;**	1	**DO NOT CREDIT** bars 3 and 4 touching
		(iii)	*trained athlete* stroke volume is greater **;** ventricle wall / cardiac muscle / heart muscle **,** thickens **;** ventricle / heart **,** contracts more strongly **;** greater cardiac output **;**	2	**CREDIT** ora for athlete who is out of training

Question			Expected Answers	Marks	Additional Guidance
		(iv)	gender **;** type of exercise **;** duration of exercise **;** BMI **;** AVP **;**	2	**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 **DO NOT CREDIT** the idea of repeats (as this refers to reliability) **IGNORE** 'weight' or 'height' eg relevant medical condition ethnicity use of performance enhancing drugs **IGNORE '**age'
			Total	**9**	

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