

Human Biology

Advanced GCE A2 H423

Advanced Subsidiary GCE AS H023

Mark Schemes for the Units

June 2009

HX23/MS/R/09

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, GCSEs, OCR Nationals, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

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.

© OCR 2009

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

Advanced GCE Human Biology (H423)

Advanced Subsidiary GCE Human Biology (H023)

MARK SCHEME FOR THE UNITS

Unit/Component	Page
F221 Molecules, Blood and Gas Exchange	1
F222 Growth, Development and Disease	12
Grade Thresholds	27

F221 Molecules, Blood and Gas Exchange

Question		Expected Answers	Marks	Additional Guidance
1	(a)	water first on list and epithelial cell last on list ; amino acid arranged before phospholipid ; phospholipid arranged before enzyme ;	3	<i>correct sequence=</i> 1. <i>water</i> 2. <i>amino acid</i> 3. <i>phospholipid</i> 4. <i>enzyme</i> 5. <i>epithelial cell</i>
	(b) (i)	to prevent the patient being infected / AW;	1	ACCEPT prevent entry of bacteria / micro-organisms ACCEPT to stop the spread, of infection / infectious disease DO NOT CREDIT to prevent contamination unqualified DO NOT CREDIT to prevent spread of disease unqualified
	(ii)	to make the veins stand out / AW ;	1	ACCEPT make the veins more visible or veins easier to see ACCEPT to make the vein protrude DO NOT CREDIT make the vein larger DO NOT CREDIT references to unqualified blood vessels IGNORE make the vein easier to locate or veins can be located or isolate or make them come closer to the surface
	(iii)	to prevent too much blood loss ; higher blood pressure in artery / AW ;	1 max	ACCEPT slows down blood flow ACCEPT reverse argument DO NOT CREDIT reference to stopping blood spurting out

Question		Expected Answers	Marks	Additional Guidance
	(c) (i)	<i>monocytes:</i> are larger ; have agranular / clear, cytoplasm have a, (kidney) bean shaped / AW, nucleus ;	2 max	CREDIT reverse argument for example: neutrophil has granular cytoplasm neutrophil has a lobed or round nucleus CREDIT answers given in annotated diagrams DO NOT CREDIT comparisons to red blood cells ACCEPT lymphocyte has less cytoplasm DO NOT CREDIT has a large nucleus unqualified
	(ii)	bone marrow ;	1	
	(iii)	red blood cell becomes a biconcave disc shape ; develops a larger SA to Vol ratio ;	1 max	DO NOT CREDIT develops a larger surface area, for haemoglobin/ of the erythrocyte DO NOT CREDIT carries more oxygen / more room for oxygen ACCEPT more room for haemoglobin
	(d) (i)	person has an infection / activated immune response / AW ; cancer ;	1 max	DO NOT CREDIT may have a disease unqualified ACCEPT reference to (a named) infectious disease ACCEPT reference to leukaemia or other cancer
	(ii)	recent injury or surgery (tissue damage) ; infection ; blood cancer ; autoimmune disease (rheumatoid arthritis) ;	1 max	ACCEPT person has a, wound / cut IGNORE reference to platelet donation

Question		Expected Answers	Marks	Additional Guidance
	(e)	person living, at high altitude / area of low air pressure ; use of erythropoietin (EPO) / blood doping ; blood cancer ; dehydration ; pregnant ; kidney / heart / lung, disease ;	1 max	
		Total	13	

Question		Expected Answers	Marks	Additional Guidance	
2	(a)	epithelium, is a tissue / consists of more than one type of cell ; ciliated cells / cells with cilia ; goblet cells ; (on) basement membrane ; QWC ;	2 max 1	IGNORE reference to hairs DO NOT CREDIT cilia without a reference to cell(s) within answer Two terms used and spelt correctly from the emboldened terms	
	(b)	(i)	maximum <u>volume</u> of air that can be moved in <u>and</u> out of lungs in one breath ; (vital capacity is) tidal volume + inspiratory reserve volume + expiratory reserve volume ; (vital capacity is) total lung capacity – residual volume ;	1 max	ACCEPT $VC = IRV + TV + ERV$ ACCEPT $VC = TLC - RV$
		(ii)	<u>volume</u> of air that can be expired in the <u>first second</u> of forced expiration ;	1	DO NOT CREDIT the volume, exhaled / expired, in, a single / one, breath
	(c)	(i)	80 ; ;	2	Correct answer = 2 marks If final answer is incorrect (not rounded or incorrectly rounded) or missing allow 1 mark for $4.5 \div 5.6$

Question			Expected Answers	Marks	Additional Guidance														
		(ii)	<table border="1"> <thead> <tr> <th rowspan="2">patient</th> <th colspan="2">diagnosis</th> </tr> <tr> <th>asthma</th> <th>COPD</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>✓</td> <td></td> </tr> <tr> <td>D</td> <td>✓</td> <td></td> </tr> <tr> <td>E</td> <td></td> <td>✓</td> </tr> </tbody> </table> ; ; ; ;	patient	diagnosis		asthma	COPD	C	✓		D	✓		E		✓	3	One mark for each CORRECT row IGNORE ✓ in COPD column for patient D
patient	diagnosis																		
	asthma	COPD																	
C	✓																		
D	✓																		
E		✓																	
Total				10															

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	<p>X SAN / sino-atrial node ; Y AVN / atrio-ventricular node ;</p>	2	DO NOT CREDIT 'pacemaker'
		(ii)	<p><i>SAN:</i> is the pacemaker / initiates the electrical impulse / AW ; (electrical) impulse is conducted, through / across, the atrial, muscle / wall ; causes, contraction of atrial (muscle) / atrial systole ; 2 max</p> <p><i>AVN:</i> delays impulse / AW ; conducts impulse to, ventricles / Bundle of His / Purkyne fibres / apex of heart ; ventricles contract / ventricular systole ; 2 max</p>	3 max	<p>CREDIT correct function for SAN and AVN if labelled incorrectly in Q3ai ie allow error carried forward</p> <p>IGNORE comments referring to pulse unqualified or electrical current or electrical signal IGNORE references to wave of excitation</p> <p>ACCEPT sends (electrical) impulse or electrical pulse</p> <p>ACCEPT conducts impulse through septum</p>

Question		Expected Answers	Marks	Additional Guidance
	(b) (i)	<p><i>trace I :</i> spikes / peaks / QRS, irregularly, spaced / intervals / AW ; spikes / peaks / QRS, more frequent / AW ; no clear Q / AW ; no clear T / AW ; no clear P / AW ;</p>	3	<p><i>Mark first three responses given by the candidate irrespective of line numbers</i></p> <p>DO NOT CREDIT any references to (heart) beats or the trace as a whole CREDIT reverse argument throughout</p> <p>ACCEPT spaces between QRS is shorter DO NOT CREDIT R peak is not as high</p>
	(ii)	<p>atrial contractions, more frequent / irregular ; ref to insufficient filling time for atria / less blood pushed into ventricles / AW ; correct reference to blood at lower <u>pressure</u> ; less, venous return / blood returned to heart ;</p>	2 max	
	(iii)	<p>(inactive prothrombin) means less thrombin is produced ; thrombin is an enzyme ; catalyses conversion of fibrinogen to fibrin / AW ; correct reference to hydrolysis ;</p> <p>low, thrombin / enzyme concentration, limits/slows down the rate of reaction / AW ;</p> <p>less / no, fibrin produced ; clot formation takes place at a slower rate ;</p> <p>QWC;</p>	3 max 1	<p>CREDIT marking points from a flow chart</p> <p>ACCEPT no thrombin formed</p> <p>IGNORE no mesh formed ACCEPT no clot formed</p> <p>Two terms used and spelt correctly from the emboldened terms</p>
		Total	14	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	whole blood ; leuco-depleted blood ; (packed) erythrocytes ; platelets ; clotting factors ; plasma ; serum ;	2 max	DO NOT CREDIT references to leucocytes ACCEPT red blood cells ACCEPT named clotting factors / factor 8
		(ii)	AIDS ; hepatitis C ; hepatitis B ;	1 max	ACCEPT HIV ACCEPT Hepatitis
	(b)		<p><i>General</i></p> <p>1 reference to making it unsuitable for use ; 2 enzymes denatured, above & below optimum pH / high temperatures ; 3 hydrogen / ionic, bonds between amino acid, R groups / side chains, break ; 4 tertiary structure / specific shape / shape of active site, altered ; 5 no enzyme-substrate complexes can form / AW ;</p> <p><i>Temperature</i></p> <p>6 temperature of 4°C slows down rate of enzyme-controlled reactions ; 7 freezing would result in the formation of ice crystals that would destroy the cells / AW ;</p>		<p>CREDIT reverse argument throughout DO NOT CREDIT statements which refer to proteins unqualified (as question specifically asks for enzyme activity)</p> <p>IGNORE change shape unqualified IGNORE references to enzymes do not work</p> <p>ACCEPT stops enzyme-controlled reactions DO NOT CREDIT blood crystallising</p>

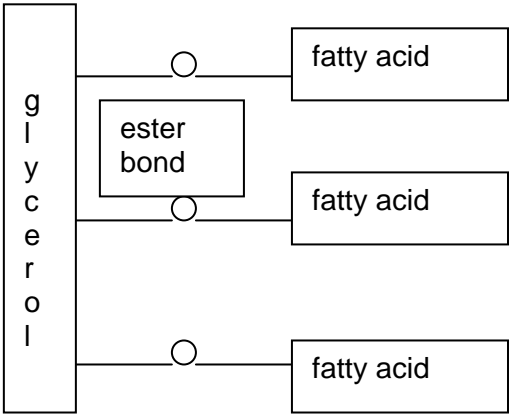
Question			Expected Answers	Marks	Additional Guidance
			<i>pH</i> 8 buffer prevents changes in pH / AW;	5 max	
			Total	8	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	vein ;	1	
		(i)	(relatively) small lumen, to maintain high blood pressure ; elastic tissue in wall, for stretch / recoil ; smooth muscle, to contract / for vasoconstriction / AW ; thick wall / layer of collagen, to withstand high pressure ; smooth endothelium, to allow blood to flow freely / AW ;	3 max	Correct function must be linked to the structure for the mark to be credited DO NOT CREDIT reference to elastic (fibres) contracting IGNORE reference to elastic (fibres) expanding ACCEPT smooth inner surface, to allow blood to flow freely / AW ; ACCEPT epithelial layer or epithelium in place of endothelium
	(b)		closed ; veins ; valves ; arterioles ; capillaries ;	5	ACCEPT phonetic spellings throughout ALLOW atrioles
Total				9	

Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	potassium ;	1	ACCEPT K ⁺
		(ii)	chloride ; hydrogen carbonate ; sodium ;	1 max	DO NOT CREDIT if potassium in list ACCEPT C/ ACCEPT HCO ₃ ⁻ ACCEPT Na ⁺
		(iii)	none ;	1	
	(b)		loss of water lowers water <u>potential</u> of, plasma / blood / AW ; by increasing concentration of, electrolytes / sodium / solutes / AW ; water, leaves cells / enters blood (from cells), by osmosis / AW ; down <u>water potential</u> gradient / AW ; crenation of cells / shrinking of cells / cell death ;	3 max	IGNORE cells shrivel
			Total	6	

F222 Growth, Development and Disease

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	<p><i>Any three from:</i></p> <p>no effect on weight ; safe / no (side) effects ;</p> <p>same appearance ;</p> <p>same packaging ; same taste ; AVP ; eg same formulation other than Rimonabant / AW</p>	3	<p>ACCEPT inert ACCEPT example eg must not be allergic to it</p> <p>ACCEPT colour same or looks same Look for idea that the placebo must not be recognisably different</p> <p>ACCEPT content (of capsule) the same</p>
		(ii)	<p>increase reliability ; (even if) people drop out ;</p> <p>people vary / AW ; more chance to see (rare) side effects ; increase validity ; ref to statistical significance ;</p>	2	<p>DO NOT CREDIT references to accuracy and precision DO NOT CREDIT reliable if given as a list eg 'to increase reliability and accuracy' as it is not clear that the candidate knows the difference.</p> <p>ACCEPT idea of avoiding bias due to other variables ACCEPT idea that small differences are more likely to be detected OR that anomalous results have little effect OR that anomalous results can be identified</p>

Question	Expected Answers	Marks	Additional Guidance
(b) (i)	<p>Allow marks from annotated diagram glycerol ; 3 , fatty acids ; joined by , ester bonds ;</p>	3	<p>DO NOT CREDIT diagram without labels DO NOT CREDIT glyceride DO NOT CREDIT fatty acids alone IGNORE ref to hydrophilic, hydrophobic, heads, tails and condensation reactions</p> 
(c) (i)	<p>X = 2.0 Y = 6.0 : 1.0</p>	2	<p>IGNORE units AWARD max 1 if all figures not given to one d.p.</p>
(ii)	<p>(risk of CHD) increases as (resting) systolic blood pressure rises ; ; (risk of CHD) increases as TC : HDL rises ; combined effect supported by data ; idea having a TC:HDL of 3 gives a low risk regardless of BP ;</p>	3 max	<p>DO NOT CREDIT explanations rather than description Look for mp1 and mp 2 in one statement BUT DO NOT CREDIT idea that TC:HDL causes highBP Look for at least 1 correct TC:HDL value, systolic BP value with units and risk value with %. eg 'A TC: HDL of 9 has lower risk of 15 – 30% until blood pressure rises above 19 kPa</p>

Question	Expected Answer	Marks	Additional Guidance
(d)	<p>excessive / AW , cost ;</p> <p>patients may need to keep taking the drug ;</p> <p>large numbers of people would need the drug ;</p> <p>named lifestyle changes more effective ;</p> <p>people should take responsibility for control of own weight / should not rely on medical intervention alone;</p> <p>named side effects ;</p> <p>AVP ;</p>	3 max	<p>Look for idea that cost is too great OR very expensive DO NOT CREDIT expensive or cost unqualified</p> <p>ACCEPT idea that they have to keep taking drug or they re-gain weight OR only temporary weight loss OR drug would need to be taken for longer than a year</p> <p>eg Idea that there are lots of potential users</p> <p>eg exercise more OR eat less OR eat less fat OR eat less sugar OR less 'fast food' DO NOT ACCEPT lifestyle unqualified</p> <p>eg a tablet just means that people will just carry on overeating</p> <p>eg leads to depression OR suicidal tendencies</p> <p>eg other medical services could suffer eg alternative drugs may already be available</p>
	Total	16	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	$\frac{\text{weight}}{(\text{height})^2}$; height in m and weight in kg ;	2	CREDIT mass instead of weight CREDIT units for weight and height from formula ACCEPT kilos instead of kilograms 'BMI is measured in kg m^{-2} ' gets both marks
		(ii)	(BMI over) 30;	1	CREDIT a figure of 30 or above IGNORE units
	(b)	(i)	growth patterns vary (between different countries) ; genetic reason for variation (in growth patterns) ; environmental / religious / cultural, reason for variation ;	2 max	eg idea that children grow at different <i>rates</i> in different countries eg idea of different ethnic groups / races DO NOT CREDIT different genes in different countries eg temperature differences between different countries e g different dietary laws regarding eating meat eg different diets OR different food available in different countries DO NOT CREDIT idea that some <i>individuals</i> consume more or less food DO NOT CREDIT any reference to exercise

Question		Expected Answer	Mark	Additional Guidance
	(ii)	19 ;	1	CREDIT 18.2 – 19.9 ACCEPT a range within 18.2 – 19.9 IGNORE any units
	(c)	calibrate equipment / AW ; repeat measurements ; standardise procedure ;	3	IGNORE references to age IGNORE reference to choosing more accurate equipment as they are told in the question that the equipment is standard eg position of feet on stadiometer / make sure they do not have shoes on / measure at same time of day/record data in same way

Question	Expected Answers	Marks	Additional Guidance
(d)	<p><i>explanation</i></p> <p>E1 (Type 2 diabetes) is non-insulin dependent ;</p> <p>E2 (usually) mature onset ;</p> <p>E3 target tissues / AW , not responding to insulin ;</p> <p><i>procedures</i></p> <p>P4 fasting blood glucose (test) ;</p> <p>P5 overnight fast / described ;</p> <p>P6 (then) blood glucose measured ;</p> <p>P7 glucose tolerance (test) ;</p> <p>P8 known quantity of glucose ingested / AW ;</p> <p>P9 repeated / timed, (blood glucose) measurement ;</p> <p>P10 comparison of result to standard levels ;</p> <p>P11 (using) biosensor / described ;</p> <p>P12 AVP ; eg sterility for blood samples eg drink water only when fasting</p>	7 max	<p><i>Minimum of 1 mark must come from marking points E1, E2 or E3</i></p> <p>CREDIT still producing insulin</p> <p>IGNORE less insulin</p> <p>eg more common in older people / middle age</p> <p>CREDIT named tissue such as liver or muscle OR cells</p> <p>DO NOT CREDIT body is not responding</p> <p>DO NOT CREDIT blood sugar BUT penalise once only eg not eating for 8 – 12 hours</p> <p>ACCEPT statement ‘measure blood glucose’.</p> <p>DO NOT CREDIT test blood glucose unless it is clear that a concentration is being measured</p> <p>CREDIT OGTT or GTT</p> <p>ACCEPT given amount / mass/ concentration</p> <p>DO NOT CREDIT given volume alone</p> <p>eg take a sample every 30 minutes and test it</p> <p>DO NOT CREDIT times less than 30 minutes</p> <p>ACCEPT use of figures eg finger prick and drop of blood placed on strip / detail of glucose oxidase etc.</p> <p><i>up to 6 max for procedure</i></p>

Question	Expected Answers	Marks	Additional Guidance
	QWC ;	1	Look for one named test and the correct sequence of steps for that test eg 4,5 and 6 in order for fasting blood glucose 7, 8 and 9 in order for glucose tolerance test
(e)	<p><i>Any two from</i></p> <p>to evaluate performance of PCTs / hospitals ; to identify at risk groups ;</p> <p>to compare different , regions/countries ; to establish trends / AW ;</p> <p>to target, resources / advice;</p> <p>to increase understanding of weight issues ;</p>	2max	<p>IGNORE any reference to advising schools</p> <p>ACCEPT to see if hospitals are meeting their targets eg to see at what age obesity becomes a problem</p> <p>eg to compare different areas or towns eg if obesity levels are changing over time</p> <p>eg educate OR support OR advise group who are more at risk eg educate food industry OR parents of obese children</p> <p>eg research or study risk factors affecting obesity</p>
	Total	19	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	B – metaphase (2) ; C – anaphase (2) ;	2	DO NOT CREDIT telophase as daughter chromosomes are not <u>at</u> poles IGNORE ref to 1 or 2 as they are told it is meiosis 2 in the stem
	(b) (i)	prophase (1) ;	1	DO NOT CREDIT letters from diagram as these refer to meiosis 2 IGNORE ref to 1 or 2
	(ii)	two chromatids drawn (on the chromosome) ; centromere labelled and in correct position ; one long arm with section shaded / coloured ;	3	DO NOT CREDIT centromere mark unless the chromatids above and below it are of different lengths. ACCEPT correct shading on either of the long arms <i>MORE THAN ONE CHROMOSOME IS DRAWN = 0</i>
	(c)	halves chromosome number / AW ; produces <u>haploid</u> gametes ; (so) chromosome number maintained (between generations) ; (after) fertilisation ; (source of) genetic variation ; mechanism example ;	3	eg produces cells with 23 chromosomes OR 1 of each pair OR 2n to n ACCEPT sex cells / sperm / egg cell DO NOT CREDIT cells alone ACCEPT idea that it prevents doubling of chromosome number DO NOT CREDIT variation alone . Look for the idea of genetic variation ACCEPT crossing over / independent assortment
		Total	9	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	S phase ; in interphase ;	2	CREDIT S stage
		(ii)	<p><i>Award up to 7 marks from points 1 - 11</i></p> <p>1 <u>semiconservative</u> (replication) ;</p> <p>2 hydrogen bonds break, DNA (molecule) unzips ;</p> <p>3 both strands act as templates ;</p> <p>4 free / activated , (DNA) nucleotides (pair up) ;</p> <p>5 (and) <u>complementary</u> base pairing (takes place) ;</p> <p>6 A to T <u>and</u> C to G ;</p> <p>7 ref to correct number of hydrogen bonds ;</p> <p>8 purine pairs with a pyrimidine ;</p> <p>9 ref role of named enzyme ;</p> <p>10 ref to phosphodiester bond formation ;</p> <p>11 each new molecule contains one old and one new (polynucleotide) strand ;</p>	7 max	<p>Look out for confusion between strands and molecule ACCEPT marks from an annotated diagram</p> <p>Look for BOTH unzipping AND hydrogen bonds between strands breaking in either order DO NOT CREDIT strands unzip</p> <p>ACCEPT new nucleotides DO NOT CREDIT nucleotides unqualified nucleotides must be new OR activated OR free AND doing something. DO NOT CREDIT bases pair up for this mark</p> <p><i>For marking points 6, ACCEPT A or Adenine, C or Cytosine, G or Guanine regardless of spelling. For Thymine the spelling must be correct</i></p> <p>eg 2 hydrogen bonds between A and T OR 3 hydrogen bonds between C and G ;</p> <p>eg DNA ,polymerase, helicase, ligase</p> <p>ACCEPT formation of sugar phosphate backbone / polynucleotide DO NOT CREDIT each strand is made of one old and one new strand</p>

Question		Expected Answers	Marks	Additional Guidance
		QWC ;	1	Look for the sequence (mp 2, followed by mp 4 or 5 or 6, followed by mp 10) <i>If a marking point has been attempted in the correct sequence but not awarded, the QWC can still be given.</i>
	(b)	<u>more</u> mutations ; immune system declines (with ageing) ; mutated / AW , cells not , detected /destroyed ; DNA proof reading not as efficient ; longer exposure to , mutagens / carcinogens ;	2 max	IGNORE references to oestrogen CREDIT either increase in number or increase in frequency eg mutations have happened more often ACCEPT weakened CREDIT idea that P53 not functioning properly CREDIT named carcinogens eg smoking
	(c) (i)	X-rays cause (more) mutation / AW ;	1	ACCEPT X rays can cause cancer
	(ii)	<i>any two from</i> PET scans ; MRI scan ; ultrasound ; thermography ;	2 max	DO NOT CREDIT mammography as this uses X rays DO NOT CREDIT CT/ CAT scan DO NOT CREDIT examining breasts for lumps
		Total	15	

Question		Expected Answers	Marks	Additional Guidance																														
5	(a)	<table border="1"> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td></td> <td>x</td> <td>x</td> <td></td> <td>;</td> </tr> <tr> <td>2</td> <td>x</td> <td></td> <td>✓</td> <td></td> <td>;</td> </tr> <tr> <td>3</td> <td>x</td> <td>x</td> <td></td> <td></td> <td>;</td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td>AB (rhesus) negative</td> <td>;;</td> </tr> </table>							1		x	x		;	2	x		✓		;	3	x	x			;	4				AB (rhesus) negative	;;	5	<p>DO NOT CREDIT hybrid ticks (a tick that has been crossed through)</p> <p>One mark per correct row for rows 1,2 and 3</p> <p>Two marks for row 4. One mark for AB and one mark for 'negative'</p>
1		x	x		;																													
2	x		✓		;																													
3	x	x			;																													
4				AB (rhesus) negative	;;																													
	(b)	(i)	haemocytometer ;	1	<p>ACCEPT phonetic spelling</p> <p>CREDIT Naubaur counting chamber</p> <p>CREDIT description of automatic Coulter® counter</p>																													
		(ii)	<p>idea of variation within population ;</p> <p>idea of variation within individual ;</p> <p>reason (for erythrocytes) ;</p> <p>reason (for leucocytes) ;</p>	2 max	<p>eg different people have different numbers of blood cells</p> <p>Look for idea that it can be different if taken on different occasion from 1 person</p> <p><i>look for correct reason</i></p> <p>eg fitness, being at high altitude (high count) anaemia (low count)</p> <p>eg infection (high count), leukaemia / other cancers (high count) HIV (low count)</p> <p>'High' or 'Low' are not essential BUT if given they must be correct</p>																													

Question		Expected Answer	Marks	Additional Guidance
(c)	(i)	A – (hyper)variable region / (antigen) binding site ; B – light (polypeptide) chain ; C – heavy (polypeptide) chain ; D – constant region ; E – hinge (region) ;	5	DO NOT CREDIT short or long chain ACCEPT disulphide hinge DO NOT CREDIT disulphide bond /bridge
	(ii)	(pathogens have) different <u>antigens</u> ; (antibodies are) <u>specific</u> (to different pathogens / antigens) ; (hyper)variable region shape / tertiary structure, varies ; (because) amino acid sequences / primary structure can vary ; (antibody and antigen have) complementary shapes ;	3 max	DO NOT CREDIT diseases have different antigens look for idea of shape varying between antibodies DO NOT CREDIT antibody shape <i>changes</i> ACCEPT antibody fits antigen DO NOT CREDIT antibody has <u>same</u> shape as antigen
	(d)	<i>any one from</i> concerns about, who has access to information ; discrimination, qualified ; concern about effect on partner ; concern about unborn child ;	1 max	DO NOT ACCEPT 'she might not want to know' unless a reason is given eg embarrassed about people finding out eg by insurance companies / employer eg might have passed it on / caught it from / be abandoned by partner eg might have to consider abortion DO NOT CREDIT worried that it may be passed on to the baby – the question is about <i>testing</i> for HIV
		Total	17	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	<p>eukaryotic ; circular ;</p> <p>organelles ;</p> <p>mitochondria / nucleus / lysosome / chloroplast / RER / SER / golgi / vesicles/vacuole/centrosome ; ;</p> <p>cellulose ;</p> <p>flagellum / mesosome / pilus / capsule / plasmid ; ;</p>	8	<p>ACCEPT ring shaped DO NOT CREDIT round</p> <p>two from these rows for gaps 4 and 5 DO NOT ACCEPT ribosomes</p> <p>two from these rows for gaps 7 and 8 ACCEPT pili</p>
	(b)	<p>(antibiotics) have no effect on viruses ;</p> <p>some diseases , caused by viruses / not caused by bacteria ;</p> <p>(some bacteria) resistant to antibiotics ;</p> <p>antibiotics used sparingly to prevent resistance developing ;</p>	3 max	<p>DO NOT CREDIT 'antibiotics are effective against bacteria', as this is given in the question</p> <p>CREDIT named example such as MRSA or mDRTB DO NOT CREDIT some diseases are resistant to antibiotics DO NOT CREDIT some bacteria are immune to antibiotics</p>
		Total	11	

Question			Expected Answers	Marks	Additional Guidance
7	(a)	(i)	(disease) always present ; in, prevalence pool / population / community / AW ;	2 max	ACCEPT ideas that there are always cases / constantly present
		(ii)	sudden increase (within a population) ; in , incidence / mortality ; within confined area / AW ;	2 max	ACCEPT outbreak DO NOT CREDIT increase in the disease CREDIT number of new cases Look for idea of a country or town or county or specified region DO NOT CREDIT area alone
		(iii)	global / continental , spread / AW ;	1	Look for idea of cases being found world wide
	(b)	(i)	(morbidity is) incidence / prevalence (of the disease) / AW ; (mortality is) deaths due to the disease / AW ;	2	ACCEPT descriptions such as number of people with the disease
		(ii)	<i>any three from</i> no information on population size ; different countries have different population size ; use of correct figures from table in support ; different reporting procedures ; accuracy of diagnosis / AW ;	3 max	ACCEPT 'not given per 100 000' or 'not given as % of population' eg' there are 25 deaths in China but only 12 in Turkey but China has a bigger population' gets marking points 2 and 3

Question	Expected Answers	Marks	Additional Guidance
(c)	<p><i>any three from</i> isolation (of infected individual); control zones / limit movement / border control / AW ;</p> <p>hygiene regimes / AW ;</p> <p>raise public awareness ;</p> <p>develop / distribute vaccine ; (provide) antivirals ; more epidemiological research ;</p> <p>prevent contact with birds / AW ; culling (domestic birds) / AW ; keeping (domestic) birds inside ; ban on poultry movement / imports ;</p>	3 max	<p>CREDIT idea of shutting schools / cancelling sports fixtures</p> <p>ACCEPT description eg hand washing / use of tissues</p> <p>CREDIT example eg advertising / leaflets</p> <p>CREDIT idea of using a vaccine to increase herd immunity</p> <p>CREDIT for birds or products from birds eg chicken, eggs</p>
Total		13	
Total		100	

Grade Thresholds

Advanced GCE Human Biology (H423)
 Advanced Subsidiary GCE Human Biology (H023)
 June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
F221	Raw	60	44	39	34	30	26	0
	UMS	90	72	63	54	45	36	0
F222	Raw	100	70	62	54	47	40	0
	UMS	150	120	105	90	75	60	0
F223	Raw	40	31	28	25	23	21	0
	UMS	60	48	42	36	30	24	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
H023	300	240	210	180	150	120	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
H023	6.3	17.8	32.6	50.5	72.1	100	0

2275 candidates aggregated this series.

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.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2009

