

Biology

Advanced GCE A2 H421

Advanced Subsidiary GCE AS H021

Mark Scheme for the Units

January 2010

HX21/MS/R/10J

F211

Mark Scheme

January 2010

F211 Cells, Exchange and Transport

Question			Expected Answers	Marks	Additional Guidance
1	(a)		<u>1500</u> ;	2	ACCEPT 1400 and 300,000 for 1 max only
			<u>500 000</u> ;		
1	(b)		ability to see (two) objects (that are close together) as separate objects / AW ; see detail ;	2	ACCEPT ability to distinguish two objects IGNORE clarity / clear
1	(c)	(i)	transports water (up plant) ;	1 max	ACCEPT alternative wording for transport e.g. movement DO NOT ACCEPT up and down DO NOT ACCEPT water and sugars
			transports, minerals / ions, (up plant) ;		ACCEPT alternative wording for transport IGNORE ref nutrients / solutes DO NOT ACCEPT sugars
			support (plant / stem / shoot) ;		ACCEPT keeps plant upright

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Question			Expected Answers	Marks	Additional Guidance
1	(c)	(ii)	<p><i>Functions:</i></p> <p>F1 (lignin), strengthens / thickens, the (xylem) <u>wall</u> ;</p> <p>F2 waterproofing (wall) / AW ;</p> <p>F3 (improving) adhesion of water (molecules) ;</p> <p>F4 (spiral) pattern allows flexibility / stretching / movement;</p> <p style="text-align: right;">2 max</p>		<p>ACCEPT support only if in specific context of supporting the xylem <u>wall</u></p> <p>ACCEPT waterproofs cell</p> <p>DO NOT ACCEPT adhesion and cohesion when used together</p> <p>Flexibility / stretching must ref, <i>pattern</i> of lignin laid down i.e. spirals</p>
			<p><i>Explanation:</i></p> <p>E1 prevents collapse of xylem ;</p> <p>E2 (water) under tension / at low pressure / negative pressure;</p> <p>E3 reduces (lateral) loss of water, through wall ;</p> <p>E4 increases capillarity / AW ;</p> <p>E5 prevents stem breaking / AW ;</p> <p style="text-align: right;">2 max</p>	3 max	<p><i>Award mark(s) for function and explanation independently</i></p> <p>DO NOT CREDIT loss of water unqualified</p>

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Question			Expected Answers	Marks	Additional Guidance
1	(c)	(iii)	(pits) allow water to move, in / out / between, <u>vessel</u> (s) ; to bypass blockage ; supply water to other, tissues / (other types) cells / parts of plant ;	2 max	ACCEPT lateral movement for 'out' ACCEPT bypass air lock ACCEPT any named, tissue / cells e.g. to allow water to other tissues 1 mark to allow water out to other tissues 1 mark to allow water out of vessel to other tissues 2 marks
			Total	10	

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Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	collection / group, of cells (of one or more types) ;	2 max	IGNORE ref similar cells
			(cells), working together OR with, common / same, function ;		ACCEPT a group of cells with a function = 2 marks
			specialised (cells) ;		DO NOT CREDIT differentiated
2	(a)	(ii)	squamous / ciliated ;	1	ACCEPT endothelium / columnar DO NOT ACCEPT cilia, goblet cell, ciliated <i>cells</i>
2	(b)		(organ is) a collection of tissues / named tissues ;	2	Look for idea of more than one tissue ACCEPT two or more correctly named tissues from: epithelium, elastic, glandular, smooth muscle, blood, nervous, cartilage, connective
			(working together) to enable gas exchange / AW ;		DO NOT ACCEPT perform a function unqualified – we want to know <i>what</i> function (can be named or described) DO NOT ACCEPT respiration IGNORE breathing

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Question			Expected Answers	Marks	Additional Guidance
2	(c)	(i)	<i>(release of energy)</i> mitochondria ;	1	
		(ii)	<i>(movement of cilia)</i> cytoskeleton ;	1	ACCEPT mitochondria if not used in (i)
		(iii)	<i>(secretion of mucus)</i> Golgi (vesicle) ;	1	ACCEPT cytoskeleton if not used in (ii) ACCEPT Golgi body / apparatus DO NOT ACCEPT Golgi vessel
			Total	8	

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Question		Expected Answers	Marks	Additional Guidance
3	(a)	partially / selectively ; (facilitated) diffusion OR osmosis ; plasma ; phospholipids ; cholesterol ;	5	DO NOT ACCEPT semi ACCEPT differentially ACCEPT plasma cell

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Question		Expected Answers	Marks	Additional Guidance
3	(b)	<p>1 (acting as) antigens ;</p> <p>2 identification / recognition, (of cells) as, self / non-self / AW ;</p> <p>3 cell signalling / described ;</p> <p>4 receptor / binding site, for, hormone / (chemical) signal / (medicinal / named) drugs ;</p> <p>5 ref. to receptor / binding site / trigger, on transport proteins / AW ;</p> <p>6 cell adhesion / to hold cells together (in a tissue) ;</p> <p>7 attach to water molecules (to stabilise membrane / cell) ;</p> <p>4 max for description</p>		<p>Look for <u>description</u> not list of functions</p> <p><i>Do not credit repetition of same point</i></p> <p>ACCEPT foreign for non-self</p> <p>ACCEPT description e.g. communication <i>between</i> cells / cell responds to, chemical / signal, <i>from another cell</i></p> <p>ACCEPT description of <i>attachment process</i> for receptor / binding site</p> <p>DO NOT ACCEPT molecule unqualified</p> <p>ACCEPT binding site for foreign antigen</p> <p>ACCEPT ref to receptors on ion channels</p> <p>ACCEPT bind to other cells for cell adhesion</p>
		<p>QWC:</p> <p>three technical terms used and spelt correctly ;</p>	5 max	<p>Any three from:</p> <p>receptor, antigen, hormone, <u>cell</u> signal(ling), adhesion, recognition, <u>facilitated</u> diffusion, <u>active</u> transport</p>
		Total	10	

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Question		Expected Answers	Mark	Additional Guidance
4	(a)	timer OR scale / ruler ;	1	
4	(b)			<i>Mark the first three suggestions irrespective of numbered points</i> <i>IGNORE reasons – just mark steps in the process</i>
		shoot is healthy ;		ACCEPT shoot not wilted
		assemble apparatus / cut shoot, under water ;		
		cut last 2-3 cm off cut end / cut at an angle ;		ACCEPT cut end off shoot
		check there are no air bubbles in apparatus ;		ACCEPT make sure cut end of shoot is in contact with water once apparatus assembled
		apparatus, water tight / air tight / has no leaks ;		ACCEPT screw clip tight DO NOT ACCEPT use Vaseline unqualified
		leaves dry ;		
			3 max	DO NOT CREDIT allow time for acclimatisation, equilibration

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Question			Expected Answers	Mark	Additional Guidance
4	(c)	(i)	<u>25.3</u> ;	1	IGNORE any units
4	(c)	(ii)	to make results (more) <u>reliable</u> ; to help identify anomalies ;	2	DO NOT ACCEPT accurate and reliable (use of both terms) anywhere in the answer Look for idea of spotting the anomaly e.g. spot, notice, recognise, show, detect. DO NOT CREDIT prevents / take out / remove / accounts for, anomalies DO NOT CREDIT 'ensure there is no anomaly' unless qualified ACCEPT outliers for anomalies ACCEPT to identify other factors / (uncontrolled) variables that may be having an effect
4	(c)	(iii)	<i>in afternoon:</i> plant dying / less healthy / wilting ; ref to stomatal closure ; more humid / <u>higher</u> water (vapour) potential in air ; less air movement / wind / draughts ;	2 max	<i>Mark first response in each numbered section (1-2). If not all sections are used, return to the first section and mark further suggestions</i> Assume answer is for different conditions in the afternoon ACCEPT ORA if stated 'in morning...' IGNORE ref to light / dark Look for comparative statements – <u>higher</u> , <u>greater</u> etc DO NOT CREDIT more moisture in air

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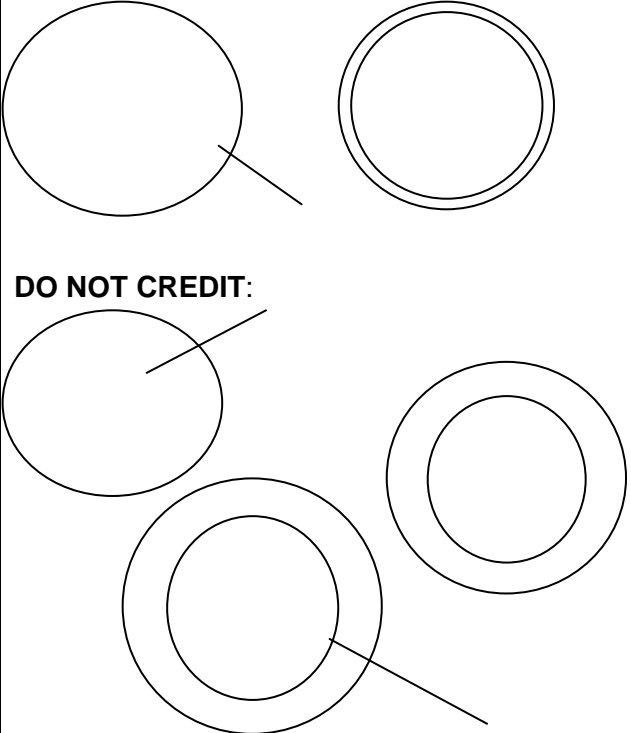
January 2010

Question			Expected Answers	Mark	Additional Guidance
4	(c)	(iv)	(potometer) measures (water) uptake ;	2 max	
			not all water (taken up) is lost ;		ACCEPT ref to figs e.g. 99% water <i>taken up</i> is lost ACCEPT the assumption that water loss is equal to water uptake is incorrect
			some water used (in photosynthesis / making cells turgid) ;		
			Total	11	

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Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	vein with thinner wall than artery ;	1	<p>CREDIT: Correct position of endothelium as indicated by circle or label line Must be clearly thinner than shown on artery</p>  <p>DO NOT CREDIT:</p>

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5	(a)	(ii)	<p><i>Arteries have:</i></p> <p>no valves ;</p> <p>endothelium / tunica intima, folded / AW ;</p> <p>more / thicker, muscle / elastic tissue / tunica media ;</p> <p>more / thicker, collagen / tunica externa ;</p>	2 max	<p><i>Assume answer refers to wall of artery.</i></p> <p>IGNORE any ref to artery wall being thicker, unqualified, as this has already been stated in the question</p> <p>IGNORE reasons for differences</p> <p>ACCEPT ORA if stated - 'vein is.....'</p> <p>Look for comparative statements</p> <p>ACCEPT tunica adventitia for tunica externa</p>
5	(b)	(i)	contraction of <u>ventricle</u> , wall / muscle ;	1	<p>ACCEPT ventricular systole</p> <p>DO NOT CREDIT heart muscle unqualified</p> <p>DO NOT CREDIT contraction of atria and ventricles</p> <p>DO NOT CREDIT pump / squeeze / push / beat without ref to contraction</p>

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5	(b)	(ii)	<p>more, (smaller) vessels / named vessels ;</p> <p>(vessels) have larger, total lumen / cross sectional area ;</p> <p>reduced resistance to blood flow ;</p> <p>arteries, stretch / expand ;</p> <p>loss of, fluid / plasma, from capillaries ;</p>	2 max	<p>ACCEPT <i>divides</i> into smaller vessels (implies more of them)</p> <p>ACCEPT larger total surface area</p> <p>DO NOT CREDIT further from the heart</p> <p>DO NOT CREDIT loss of, blood / water</p> <p>DO NOT CREDIT loss of fluid / plasma, unqualified or from other vessels</p>
5	(b)	(iii)	<p>plasma / fluid, moves out of, capillary / blood ;</p> <p>enters / forms, tissue fluid ;</p> <p>(plasma) proteins, remain in capillary / too large to pass through capillary wall / AW ;</p> <p>(fluid moves) down pressure gradient ;</p> <p>hydrostatic pressure greater than, water potential / Ψ;</p>	3 max	<p><i>Assume 'it' refers to plasma:</i></p> <p>DO NOT CREDIT water / diffuses out</p> <p>ACCEPT filters out</p> <p>DO NOT CREDIT ref to osmosis</p>

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Marks		Expected Answers	Marks	Additional Guidance
5	(c)	X = carbonic anhydrase ;	3	ACCEPT correct phonetic spelling DO NOT ACCEPT anhydrase
		Y = carbonic acid / H_2CO_3 ;		If formula <u>only</u> given, it must be correct. Incorrect formula can be ignored if correct name given.
		Z = hydrogen (ion) / H^+ ;		DO NOT CREDIT H alone
Total			12	

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Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	<p>diaphragm / intercostal muscles, contract :</p> <p>diaphragm moves down / ribs move upwards <u>and</u> outwards ;</p> <p>volume of thorax increased ;</p> <p>pressure inside thorax falls ;</p> <p>to below atmospheric pressure (so air enters lungs) ;</p> <p>2 max for mechanism</p>		<p><i>First two points are marked independently</i></p> <p>DO NOT CREDIT <i>internal</i> intercostal muscles contract</p> <p>DO NOT CREDIT diaphragm flattens alone</p> <p>ACCEPT movement of diaphragm pushes digestive organs down</p> <p>DO NOT ACCEPT expands (for increased volume)</p> <p>DO NOT ACCEPT size for volume</p> <p>ACCEPT capacity for volume</p> <p>ACCEPT lungs / chest (cavity), for thorax</p> <p>DO NOT CREDIT pressure gradient alone - <i>direction</i> of gradient must be specified</p>
			<p>QWC:</p> <p>accept three technical terms used and spelt correctly ;</p>		3 max

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Question			Expected Answers	Marks	Additional Guidance
6	(a)	(ii)	it falls / goes down / AW ;	1	ACCEPT decreases in volume / volume gets smaller DO NOT CREDIT empties, closes, flattens, deflates, becomes smaller DO NOT ACCEPT amount for volume
6		(iii)	soda lime / sodium hydroxide / potassium hydroxide / calcium hydroxide ;	1	ACCEPT correct formulae NaOH / KOH / Ca(OH) ₂ DO NOT ACCEPT calcium oxide ACCEPT limewater, lime soda
6	(b)		to ensure all air breathed comes from chamber OR to prevent, escape of air / entry of air, through nose ;		ACCEPT air may be breathed in or out through nose ACCEPT ensures breathes through mouth
			make results <u>invalid</u> ;	2 max	DO NOT ACCEPT ref accuracy, reliability, false results DO NOT ACCEPT invalid and accuracy / reliability (use of both terms) anywhere in the answer

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6	(c)		use (medical grade) oxygen / fresh air ;	2 max	<i>Note question relates to measuring vital capacity</i> ACCEPT ensure there is enough oxygen / air
			disinfect mouthpiece ;		ACCEPT change / wash mouthpiece
			ref. to health of subject ;		e.g. asthmatics
			ref to correct functioning of equipment ;		e.g. maintain constant temperature (so that volume of gases is not affected) ensure, valve / hinge, is working level of water correct no leaks / airtight / lips sealed around mouthpiece
			Total	9	

Grade Thresholds

Advanced GCE (Biology) (H021 H421)
January 2010 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
F211	Raw	60	40	35	31	27	23	0
	UMS	90	72	63	54	45	36	0
F212	Raw	100	69	62	56	50	44	0
	UMS	150	120	105	90	75	60	0
F214	Raw	60	40	36	32	28	25	0
	UMS	90	72	63	54	45	36	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
H021	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
H021	8.8	28.6	54.1	78.4	95.1	100.0	1505

1505 candidates aggregated this series

For a description of how UMS marks are calculated see:

<http://www.ocr.org.uk/learners/ums/index.html>

Statistics are correct at the time of publication.