

Biology

Advanced GCE A2 H421

Advanced Subsidiary GCE AS H021

Mark Scheme for the Units

January 2009

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Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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F211

Mark Scheme

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F211 Cells, Exchange and Transport

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	<p>A smooth endoplasmic reticulum / SER</p> <p>B nuclear, membrane / envelope ;</p> <p>C mitochondrion ;</p> <p>D nucleolus ;</p>	4	<p><i>mark first response on each line only</i></p> <p>ACCEPT nucleus, membrane / envelope</p> <p>ACCEPT mitochondria</p> <p>DO NOT ACCEPT nucleous</p>
	(a)	(ii)	<p>(mitochondria) vary in shape ; longer than wide ;</p> <p>cut in different planes / angles / AW ;</p> <p>just divided / growing ; artefact / deformed during preparation of section ;</p>	2 max	<p>ACCEPT sausage shaped/long and thin</p> <p>ACCEPT if shown by drawing</p> <p><i>need comparative statement</i></p> <p>ACCEPT C has been cut in longitudinal plane, E has been cut in transverse, section / plane</p> <p>ACCEPT one cut horizontally, other cut vertically</p> <p>ACCEPT in different positions / one viewed from above the other from the side</p>

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Question			Expected Answers	Marks	Additional Guidance
1	(a)	(iii)	<p>correct answer = two marks</p> <p>3.75 / 3.8 ;;</p> <p>if answer incorrect ALLOW one mark for correct working</p>	2	<p>ACCEPT if 3.75 or 3.8 is seen anywhere in response (even if later rounded to 4)</p> <p>Max 1 if response is 4 with no working</p> <p>how to award one mark for working e.g.</p> <p>candidate shows correct calculation but wrong answer</p> $\text{actual length} = \frac{20 \times 15}{80}$ <p>OR</p> <p>candidate uses magnification (x4000) in calculation:</p> $\text{actual length} = 15000 / 4000 ;$ <p>length of C should be 15mm / 15000μm</p> <p>ACCEPT ecf for working mark if length of C is not measured correctly but incorrect figure is used in calculation correctly</p>
1	(b)	(ii)	<p>proteins moved to Golgi (apparatus / body) ; processed / modified / AW ;</p> <p>into <u>vesicles</u> ;</p> <p>(vesicle) moved to, plasma / cell surface, membrane ; (vesicles) <u>fuse</u> with membrane ; <u>exocytosis</u> ;</p>	3 max	<p>e.g. carbohydrate group added</p> <p>DO NOT ACCEPT reprocessed</p> <p>idea that product of processing is placed into vesicles for transport</p> <p>DO NOT ACCEPT vacuole – but do not penalise more than once</p> <p>DO NOT ACCEPT ‘cell membrane’</p>
				[Total: 11]	

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Question		Expected Answers	Marks	Additional Guidance										
2	(a)	<table border="1"> <thead> <tr> <th>description</th> <th>letter</th> </tr> </thead> <tbody> <tr> <td>an animal cell that has been placed in water</td> <td>N ;</td> </tr> <tr> <td>an animal cell that has been placed in a strong sugar solution</td> <td>K ;</td> </tr> <tr> <td>a plant cell that has been placed in water</td> <td>L ;</td> </tr> <tr> <td><i>a plant cell that has been placed in a strong sugar solution</i></td> <td></td> </tr> </tbody> </table>	description	letter	an animal cell that has been placed in water	N ;	an animal cell that has been placed in a strong sugar solution	K ;	a plant cell that has been placed in water	L ;	<i>a plant cell that has been placed in a strong sugar solution</i>		3	
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<i>a plant cell that has been placed in a strong sugar solution</i>														
2	(b)	<p>water moves out of cell ; by osmosis ;</p> <p>cell has, <u>higher</u> / <u>greater</u> / <u>less</u> negative, <u>water potential</u> (than surrounding solution) / ORA ;</p> <p>(water moves) <u>down water potential</u> gradient/from high to low <u>water potential</u> ;</p>	3 max	<p><i>note: this is explain not describe</i></p> <p>ACCEPT Ψ for water potential must be comparative – DO NOT ACCEPT high alone</p> <p>DO NOT ACCEPT across or along water potential gradient DO NOT ACCEPT ref to water concentration anywhere IGNORE ref to solute potentials</p>										

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Question		Expected Answers	Marks	Additional Guidance
2	(c)	<p><i>small, non-polar substances</i> diffuse (through membrane / phospholipid bilayer) ;</p> <p><i>large substances</i> (using), transport / carrier, proteins ;</p> <p>endocytosis / phagocytosis / described ;</p> <p><i>polar substances</i> through, pore / channel, proteins ; (using), transport / carrier, proteins ;</p> <p><i>general – must be used in correct context, each once only</i> ref to facilitated diffusion ;</p> <p>ref to active transport / use of ATP ;</p> <p style="text-align: right;">4 max</p> <p>QWC – technical terms spelled AND used in correct context ;</p> <p style="text-align: right;">1</p>	5 max	<p>ACCEPT diffusion / diffuses</p> <p>ACCEPT protein pump DO NOT ACCEPT channel proteins here ACCEPT pinocytosis</p> <p>apply only to large / polar substances</p> <p>apply only to large / polar substances DO NOT ACCEPT ref to active transport with channel proteins</p> <p>(three from: phospholipid / bilayer / diffusion / facilitated diffusion / active transport / transport protein / carrier protein / channel protein / pinocytosis / endocytosis / phagocytosis)</p> <p>if protein spelled incorrectly throughout, only penalise once</p>
			[Total : 11]	

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Question			Expected Answers		Additional Guidance
3	(a)	(i)	a cell that is, unspecialised / not differentiated ; capable of, division / mitosis ; able to, differentiate / specialise / become other cell types ;	2 max	DO NOT ACCEPT replication ACCEPT totipotent / pluripotent / omnipotent
3	(a)	(ii)	cambium / meristem / early embryonic cells ;	1	ACCEPT plants have no stem cells
	(b)		growth (of tissue / organism) ; replace (cells) / repair (tissues) ; <u>asexual</u> reproduction/cloning / producing genetically identical cells ; maintain chromosome number in all cells ;	3	<i>initially mark first response on each line, if not all lines used, go back and credit further correct points</i> DO NOT ACCEPT growth of cells DO NOT ACCEPT repair of cells ACCEPT ref to maintain, haploid / diploid, number
	(c)	(i)	higher percentage remain leukaemia free (for five years) / AW ; ORA use of figs ;	2	<i>Need clear comparative statement</i> DO NOT ACCEPT 'more people' e.g. 60% cf. 38% approx. one and a half times more 22% more e.g. ALLOW one mark for: '60% given cord blood cells survive, 38% given marrow cells survive for five years' ALLOW two marks for: '60% given cord blood cells survive but only 38% given marrow cells survive for five years' as this is a comparative statement

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Question		Expected Answers		Additional Guidance
	(c) (ii)	<p>1 greater availability of cord cells / more likely to find donors;</p> <p>2 easier to harvest / no pain for donor ;</p> <p>3 cells at earlier stage of development ;</p> <p>4 can be stored for future, use/repair / gene therapy, of donor ;</p> <p>5 slightly mismatched cord cells work (almost) as well as marrow cells ;</p>	2	<p>ACCEPT ORA throughout</p> <p>ACCEPT easier to extract/obtain / less risky / less invasive</p> <p>ACCEPT can differentiate into wider range of cells</p> <p>DO NOT ACCEPT cells younger</p>
			[Total : 10]	

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Question		Expected Answers	Marks	Additional Guidance								
4	(a)	<p>large / active, organisms have high(er), demand for oxygen / need to remove CO₂ ;</p> <p>small(er), <u>surface area to volume ratio / SA:V / surface area:volume</u> ;</p> <p>surface area too small / distance too large / diffusion takes too long (to supply needs) ;</p>	2 max	<p>ACCEPT ORA throughout</p> <p>IGNORE ref to nutrients</p> <p>ACCEPT diffusion too slow</p> <p><i>look for reason why diffusion not good enough</i></p>								
	(b)	<p>create / maintain, (steep), diffusion / concentration, gradient ;</p> <table border="1" data-bbox="362 655 1240 1002"> <tr> <td></td> <td></td> </tr> <tr> <td><i>epithelium</i></td> <td>short (diffusion) distance ;</td> </tr> <tr> <td><i>capillaries</i></td> <td>delivers carbon dioxide (to be removed from blood) / carries oxygen away (from alveoli) ; short (diffusion) distance ;</td> </tr> <tr> <td><i>diaphragm / intercostal muscles</i></td> <td>ventilation / supply of oxygen (to alveoli) / removal of carbon dioxide (from alveoli) ;</td> </tr> </table>			<i>epithelium</i>	short (diffusion) distance ;	<i>capillaries</i>	delivers carbon dioxide (to be removed from blood) / carries oxygen away (from alveoli) ; short (diffusion) distance ;	<i>diaphragm / intercostal muscles</i>	ventilation / supply of oxygen (to alveoli) / removal of carbon dioxide (from alveoli) ;	3 max	<p><i>could give mark in any row as an additional mark – but only once</i></p> <p>DO NOT ACCEPT any vague reference to ‘gases’ throughout</p> <p>ACCEPT short diffusion distance here even if given above</p> <p>ACCEPT breathing in and out / AW</p>
<i>epithelium</i>	short (diffusion) distance ;											
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<i>diaphragm / intercostal muscles</i>	ventilation / supply of oxygen (to alveoli) / removal of carbon dioxide (from alveoli) ;											
4	(c)	<p>diaphragm (contracts / flattens and) moves downwards ;</p> <p>intercostal muscles <u>contract</u> to move ribs, up / out ;</p> <p>increase <u>volume</u> of thorax ;</p> <p>reduce pressure inside thorax ;</p> <p>to below atmospheric pressure/creates pressure gradient / AW ;</p>	4 max	<p>IGNORE ref to internal / external</p> <p>ACCEPT increase volume of lungs / chest</p> <p>ACCEPT decrease pressure in lungs / chest</p> <p>must ensure the pressure gradient is in correct direction – lower in lungs</p>								

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Question			Expected Answers	Marks	Additional Guidance
4	(d)	(i)	a clear X placed on any part of trace where line is sloping down ;	1	ACCEPT label line with X DO NOT ALLOW X on tip of crest / trough
4	(d)	(ii)	3 dm ³ ;	1	correct units must be given ACCEPT litres
				[Total: 11]	

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Question		Expected Answers	Marks	Additional Guidance	
5	(a)	<p><i>single circulatory system:</i> blood passes through the heart once for each, circulation / circuit / cycle, of the body ;</p> <p><i>closed circulatory system:</i> the blood is maintained inside vessels ;</p>	2	<p>DO NOT ACCEPT ref to <u>cardiac</u> cycle DO NOT ACCEPT 'blood passes through heart once' - it must be clear there is a circuit / return to heart ACCEPT description e.g. heart to gills to body to heart ACCEPT ref to no separate pulmonary and systemic systems ACCEPT ref to lungs</p> <p>ACCEPT names of two types of vessel as alternative to 'vessels'</p>	
5	(b)	(i)	<p>T SAN / sinoatrial node ;</p> <p>U AVN / atrioventricular node ;</p> <p>V bundle of His / Purkyne tissue ;</p>	3	<p>ACCEPT pacemaker DO NOT ACCEPT sinoarterial / artrial node DO NOT ACCEPT arterioventricular node ACCEPT Purkinje</p>

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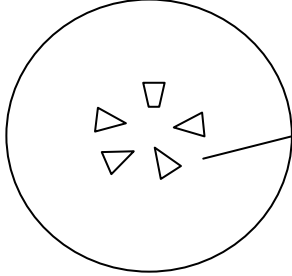
January 2009

Question			Expected Answers	Marks	Additional Guidance
5	(b)	(ii)	<p>T / SAN, creates / initiates / starts / originates, excitation ;</p> <p>wave (of excitation) spreads over atrial, <u>wall / muscle</u> ; ref to, AVN / U ; atria contract / atrial systole ; contraction is synchronised / AW ; delay at AVN ; (excitation spreads) down septum ;</p> <p>ref to, bundle of His / Purkyne fibres ; ventricles contract / ventricular systole, from, apex / bottom ;</p> <p>QWC – technical terms, spelled AND used in correct context</p>	<p>4 max</p> <p>1</p>	<p>ACCEPT acts as pacemaker ACCEPT impulse / action potential / depolarisation DO NOT ACCEPT electricity / signal / message DO NOT ACCEPT if response suggests that brain needed to trigger SAN</p> <p>ACCEPT EITHER in context of both atria OR both ventricles contracting together ACCEPT Purkinje</p> <p>any three from: pacemaker, sinoatrial node, atrioventricular node, excitation, atrial / atrium / atria, septum, Purkyne, bundle of His, ventricle(s) / ventricular, apex, systole.</p>
				[Total: 10]	

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Question		Expected Answers	Marks	Additional Guidance
6	(a)	3 – 5 discrete patches in ring (near centre) ;	1	<p>if xylem drawn then phloem <u>must</u> be labelled</p> <p>DO NOT ACCEPT vascular bundles around edge DO NOT ACCEPT if phloem occupies more than half total width</p>  <p>patches can be any shape</p>
6	(b)	<p>A / labelled carbon can be observed in the phloem soon after being supplied to the plant ;</p> <p>B / the rate of flow of sugars in the phloem is higher than diffusion ;</p> <p>C / an insect such as an aphid feeds by inserting its proboscis (mouth parts) into the phloem ;</p>	max 2	<i>mark first two letters only</i>

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Question		Expected Answers	Marks	Additional Guidance
	(c)	<p><i>source</i> site where, sucrose / sugars / assimilates, loaded (into phloem) / AW ;</p> <p><i>sink</i> site where, sucrose / sugars / assimilates, unloaded / removed (from phloem) / AW ;</p>	2	<p>DO NOT ACCEPT glucose / substance throughout</p> <p>ACCEPT where, sucrose / sugars / assimilates, produced/created or converted from stored products</p> <p>DO NOT ACCEPT terms 'loading' and 'unloading' in wrong context</p> <p>ACCEPT where, sucrose / sugars / assimilates, stored or used (in metabolic processes)</p> <p>DO NOT ACCEPT 'required' or 'needed' instead of 'used'</p>
6	(d)	<p>(sugars) cannot pass the cut / AW ;</p> <p>decrease water potential ; water moves into cells ;</p> <p>(damage triggers) increased cell division ; to produce cells to store sugars ;</p> <p>cut causes, gall / infection ;</p>	2 max	<p>ACCEPT sugars, stuck above cut / stuck at top of tree / can't move down/build up above cut</p>
			[Total: [7]	

Grade Thresholds

Advanced Subsidiary GCE Biology H021 H421
January 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
F211	Raw	60	46	41	36	31	26	0
	UMS	90	72	63	54	45	36	0

Specification Aggregation Results

The first AS aggregation for this specification will be in June 2009.

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

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