OCR
RECOGNISING ACHIEVEMENT

GCE

Biology

Advanced GCE **A2 H421**

Advanced Subsidiary GCE **AS H021**

Mark Scheme for the Units

June 2009

H021/H421/MS/R/09

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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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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

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F211 Cells, Exchange and Transport

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	goblet / mucus (secreting) cell ; ciliated (epithelium) ;	2	**DO NOT ACCEPT ‘**globlet**’** **DO NOT ACCEPT ‘**cilia cell’ ‘ciliate’
1	(a)	(ii)	(A / goblet cells) release mucus / AW ; (mucus) traps, dust / particles / named particle ; ciliated cell / B / cilia, wave / waft / move, mucus ; to, top of trachea / back of mouth / AW ;	3 max	**ACCEPT** release / creates / produces / secretes **DO NOT ACCEPT** excrete **ACCEPT** bacteria / microorganisms / pathogens **IGNORE** dirt / germs **DO NOT ACCEPT** ‘combines with’ **ACCEPT** ‘hair like projections’ **DO NOT ACCEPT** ‘hairs’ Idea of up and out of lungs
1	(a)	(iii)	to constrict the bronchus / AW ;	1	example of AW e.g. reduce diameter of bronchus **DO NOT ACCEPT** ‘ref to increasing diameter’ – (note: if ‘increase and decrease diameter’ is used do not allow mark as it is contradiction) **ACCEPT ‘**airways’ **ACCEPT** ‘control flow of air’

Question			Expected Answers	Marks	Additional Guidance
1	(b)	(i)	short, distance / path / AW **;** (so that) diffusion / concentration, gradient is, high / steep **;** high rate of, (gas) exchange / diffusion **;**	**2 max**	**DO NOT ACCEPT** ref to number of cells / cell thickness or short space **DO NOT ACCEPT** short gradient **ACCEPT** high rate of movement of named gas in correct direction **ACCEPT** **'**rapid' / fast / quick **ACCEPT** ref to efficient, gas exchange / diffusion **DO NOT ACCEPT** gas exchange occurs more 'easily'
	(b)	(ii)	recoil / expel air / prevent bursting **;**	**1**	**ACCEPT** exhale more completely / force air out **DO NOT ACCEPT** 'exhale' (if used alone) **DO NOT ACCEPT** 'contract' **DO NOT ACCEPT** 'stretch' on its own **DO NOT ACCEPT** if response includes any ref to bronchus or smooth muscle
			Total	**9**	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	**D** cholesterol **;** **E** protein / glycoprotein / intrinsic protein / protein channel / protein pump / transport protein / carrier protein **;** **F** phospholipid (bilayer) / phospholipid head **;**	3	**ACCEPT** polypeptide chain **DO NOT ACCEPT** amino acid chain **DO NOT ACCEPT** extrinsic protein **DO NOT ACCEPT** lipids / bilayer
2	(a)	(ii)	**D** stabilise the membrane OR maintain / affect / control / AW, fluidity OR reduces permeability to, polar / charged, particles **;** **E** allow communication across membrane OR allow, polar / charged, particles to pass through membrane **;** **F** to act as a barrier (to, polar / charged, particles) / select what enters or leaves cell **;**	3	***mark independently of (a)(i) i.e. NO ecf*** **DO NOT ACCEPT** refs to rigidity / support / strength **ACCEPT** reduces / affects, lateral movement of phospholipids **ACCEPT** cell recognition / receptor site / cell signalling / cell attachment **ACCEPT** (acts as) selectively permeable or partially permeable membrane **ACCEPT** allows small / fat soluble molecules to pass through **DO NOT ACCEPT** separates inside from outside
2	(b)	(i)	communication between cells / AW **;** cell, recognition / identification **;** cells work together / coordination between action of different cells **;** to trigger, response / reaction (inside the cell) **;**	**2 max**	**ACCEPT** example to illustrate the point, e.g. action of hormone / cytokines
2	(b)	(ii)	(receptor) specific shape / described **;** complementary to (shape of), trigger / named trigger / communicating **;** molecule **;** (trigger / AW) binds / attaches to receptor **;**	**2 max**	**ACCEPT** tertiary structure **DO NOT ACCEPT** ref to active site **ACCEPT** fits / idea of lock & key in correct context **DO NOT ACCEPT** 'matches' **DO NOT ALLOW** joins / bonds / links / combines / fits

Question			Expected Answers	Marks	Additional Guidance
2	(c)	(i)	cell surface / plasma, membrane damaged ; pigment, released / leaks out ; pigment, absorbs / takes up, the light ;	2 max	**ACCEPT** description of damage e.g. proteins denatured / phospholipids separate / bilayer melts **DO NOT ACCEPT** bilayer becomes 'more fluid' **DO NOT ACCEPT** 'cell membrane' unqualified **ACCEPT** 'cell contents' for pigment **DO NOT ACCEPT** 'no light transmitted' 'solution is opaque'
2	(c)	(ii)	*Mark first response on each numbered line. Only return to extra points on first or second line if no response in line two or three* more samples at each temperature ; same / fixed, volume of water ; all samples same, size / surface area ; ref to further cutting to increase surface area ; pieces, rinsed / blotted, after cutting ; more (intermediate) temperatures ; same beetroot used / same part of beetroot used ;	3 max	 **ACCEPT** repeats **ACCEPT** collect average / mean results **DO NOT ACCEPT** mass **ACCEPT** any method of cutting to provide larger surface area **ACCEPT** list of figures of additional temps between 0-100 **DO NOT ACCEPT** wider range of temperatures / more evenly spaced temperatures **DO NOT ACCEPT** leave for longer **DO NOT ACCEPT** idea of control
			Total	**15**	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		transpiration ; xylem ; osmosis ; stoma(ta) / stomatal pore ;	4	**DO NOT ACCEPT** 'diffusion' alone **ACCEPT** diffusion with osmosis used as qualification **DO NOT ACCEPT** 'pore' or 'guard cells'
3	(b)	(i)	stomata (open to) allow, gaseous exchange / carbon dioxide in / oxygen out / AW ; (gaseous exchange) for photosynthesis ; (photosynthesis) essential for plant to, gain energy / make sugars ; some water lost through cuticle ;	2 max	look for reverse argument **DO NOT ACCEPT** ref to air OR to get gases OR let gases in **ACCEPT** 'gases in and out'
	(b)	(ii)	xerophyte ;	1	**DO NOT ACCEPT** cactus

Question			Expected Answers	Marks	Additional Guidance
	(b)	(iii)	*Allow the first point **once** as further explanation for A1 – A4 in addition to the linked explanation:* reduce water (vapour) **potential gradient** / **diffusion** gradient **;** **[A 1]** hairy leaves **;** trap **water vapour** / moisture **;** **[A 2] stomata,** in pits / sunken **;** pits trap, **water vapour** / moisture **;** **[A 3]** rolled leaves / presence of **hinge cells ;** reduce **surface area** OR (rolled leaves) trap **water vapour** / moisture **;** **[A 4]** high solute concentration in cells **;** reduces water potential inside leaf cells **;** **[A 5]** thick(er) **cuticle ;** (which is) waterproof / (relatively) **impermeable ;** **[A 6]** small leaves / **needles ;** smaller **surface area ;** **[A 7]** fewer **stomata ;** reduces **diffusion** (of water vapour) **;** **[A 8] stomata** close, during the day **;** reduces **diffusion** (of water vapour) **;** **[A 9]** most **stomata** on lower surface **;** less exposure to sun OR cooler OR reduces diffusion (of water vapour) **;**		***MARK FIRST <u>TWO</u> ADAPTATIONS <u>ONLY</u>*** **ALLOW** max 2 for adaptation [A] marks Explanation must be linked to an appropriate statement of adaptation. Allow an explanation mark even if adaptation mark not awarded. **DO NOT ACCEPT ‘**water’ for ‘water vapour’ throughout **DO NOT ACCEPT** ‘transpiration’ for diffusion of water vapour throughout **DO NOT ACCEPT** surface area to volume ratio **ACCEPT ‘**spines’ **DO NOT ACCEPT** surface area to volume ratio

Question			Expected Answers	Marks	Additional Guidance
			[A 10] more densely packed spongy mesophyll **;** smaller surface area for evaporation (from mesophyll cell surface) **;** 4 max QWC - technical terms used appropriately and spelt correctly **;** 1	**5 max**	Use three terms from: cuticle, impermeable, water vapour, potential gradient, diffuse / diffusion, stoma(ta), needles, surface area, hinge cells, saturated
			Total	**12**	

Question			Expected Answers		Marks	Additional Guidance
4	(a)		prokaryotic	eukaryotic	4	
				as chromosomes / chromatin OR (genetic material) associated with, proteins / histones ;		**DO NOT ACCEPT** chromatid
				(diameter of cell) 20 – 40 μm ;		Figures must have correct units **ACCEPT** any figure(s) in range 10 – 100 μm
			(ribosomes) 18**nm** ;			**ACCEPT** any figure(s) in range 10 – 20 nm **ACCEPT** 70 S
			cell wall (present) ;			**DO NOT ACCEPT** sometimes or usually present
	(b)	(i)	flagellum / cilium / microtubule / microfilament / undulipodium ;		1	**ACCEPT** plurals
4	(b)	(ii)	(*movement <u>inside cells</u> of*) chromosomes / chromatids (in cell division) ; (cytoplasm in) cytokinesis ; organelles / named organelle ; RNA (in protein synthesis) ; proteins ;		2 max	**DO NOT ACCEPT** mitosis / cell division e.g. centriole / vesicle / lysosome / mitochondrion / chloroplast / ribosome ensure that the proteins are being moved in cytoplasm by microtubules rather than by ER or in vesicles (mark given above)
			Total		7	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		Q, T, P, R **;** **;** **;** **;**	4	Allocate marks for the following pairs: S – Q Q – T T – P P - R
5	(b)	(i)	growth of cell / growth of organelles / increase number of organelles / synthesis of proteins **;**	1	**DO NOT ACCEPT ‘**growth’ unqualified **DO NOT ACCEPT** refs to DNA replication **IGNORE** ref. to respiration **ACCEPT** named steps in protein synthesis
5	(b)	(ii)	mutation / faulty DNA produced / error in copying **;** daughter cells will not receive identical genetic information **;** proteins / (daughter) cells, not made / do not function **;**	2	**ACCEPT ‘**daughter cells will not be clones’ **ACCEPT ‘**proteins / daughter cells function differently’
5	(c)		haploid / half genetic information / chromosome number is n **;** genetic information not identical / produces genetically different cells **;** 4 cells produced **;**	2 max	**ACCEPT** use of comparative chromosome numbers as example **DO NOT ACCEPT** identical / not identical without ‘genetic’ **DO NOT ACCEPT** smaller cells
			Total	9	

Question			Expected Answers	Marks	Additional Guidance	
6	(a)	(i)	cardiac ;	1	**ACCEPT** myogenic	
6	(a)	(ii)	(muscle) contraction / systole ;	1	**ACCEPT** atrial or ventricular systole **DO NOT ACCEPT** atrial or systolic pressure	
6	(b)	(i)	*correct answer = two marks* 75 ; ; *if answer incorrect **ALLOW** one mark for correct working* 60 / 0.8	2		
6	(b)	(ii)	pressure in **ventricle** is below (pressure in) **atrium** ; **bicuspid** / **atrioventricular** valve, open(s) ; blood flows into (atrium and) ventricle ; max 3 QWC - technical terms used appropriately and spelt correctly ; 1	4	ORA **ACCEPT** mitral **DO NOT ACCEPT** pushed or pumped **DO NOT ACCEPT** arterioventricular Use three terms in correct biological context from: ventricle / ventricular, atrium / atrial, bicuspid, mitral, atrioventricular, diastole	
			Total	8		

			Paper Total	60		