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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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# F211 Cells, Exchange and Transport

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

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 1 | (b) | (i) | short, distance / path / AW ;<br><br>(so that) diffusion / concentration, gradient is, high / steep ;<br>high rate of, (gas) exchange / diffusion ; | 2 max | **DO NOT ACCEPT** ref to number of cells / cell thickness or short space<br>**DO NOT ACCEPT** short gradient<br>**ACCEPT** high rate of movement of named gas in correct direction<br>**ACCEPT** 'rapid' / fast / quick<br>**ACCEPT** ref to efficient, gas exchange / diffusion<br>**DO NOT ACCEPT** gas exchange occurs more 'easily' |
| | (b) | (ii) | recoil / expel air / prevent bursting ; | 1 | **ACCEPT** exhale more completely / force air out<br>**DO NOT ACCEPT** 'exhale' (if used alone)<br>**DO NOT ACCEPT** 'contract'<br>**DO NOT ACCEPT** 'stretch' on its own<br>**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 **;**<br>**E** protein / glycoprotein / intrinsic protein / protein channel / protein pump / transport protein / carrier protein **;**<br>**F** phospholipid (bilayer) / phospholipid head **;** | 3 | **ACCEPT** polypeptide chain<br>**DO NOT ACCEPT** amino acid chain<br>**DO NOT ACCEPT** extrinsic protein<br>**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 **;**<br>**E** allow communication across membrane OR allow, polar / charged, particles to pass through membrane **;**<br>**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***<br>**DO NOT ACCEPT** refs to rigidity / support / strength<br>**ACCEPT** reduces / affects, lateral movement of phospholipids<br>**ACCEPT** cell recognition / receptor site / cell signalling / cell attachment<br>**ACCEPT** (acts as) selectively permeable or partially permeable membrane<br>**ACCEPT** allows small / fat soluble molecules to pass through<br>**DO NOT ACCEPT** separates inside from outside |
| 2 | (b) | (i) | communication between cells / AW **;**<br>cell, recognition / identification **;**<br>cells work together / coordination between action of different cells **;**<br>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 **;**<br>complementary to (shape of), trigger / named trigger / communicating **;**<br>molecule **;**<br>(trigger / AW) binds / attaches to receptor **;** | 2 max | **ACCEPT** tertiary structure<br>**DO NOT ACCEPT** ref to active site<br>**ACCEPT** fits / idea of lock & key in correct context<br>**DO NOT ACCEPT** 'matches'<br>**DO NOT ALLOW** joins / bonds / links / combines / fits |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 2 | (c) | (i) | cell surface / plasma, membrane damaged ;<br><br><br><br>pigment, released / leaks out ;<br>pigment, absorbs / takes up, the light ; | <br><br><br><br><br>2 max | **ACCEPT** description of damage e.g. proteins denatured / phospholipids separate / bilayer melts<br>**DO NOT ACCEPT** bilayer becomes 'more fluid'<br>**DO NOT ACCEPT** 'cell membrane' unqualified<br>**ACCEPT** 'cell contents' for pigment<br>**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*<br><br>more samples at each temperature ;<br><br>same / fixed, volume of water ;<br>all samples same, size / surface area ;<br>ref to further cutting to increase surface area ;<br><br>pieces, rinsed / blotted, after cutting ;<br>more (intermediate) temperatures ;<br><br><br>same beetroot used / same part of beetroot used ; | <br><br><br>3 max | <br><br>**ACCEPT** repeats<br>**ACCEPT** collect average / mean results<br><br>**DO NOT ACCEPT** mass<br>**ACCEPT** any method of cutting to provide larger surface area<br><br>**ACCEPT** list of figures of additional temps between 0-100<br>**DO NOT ACCEPT** wider range of temperatures / more evenly spaced temperatures<br><br>**DO NOT ACCEPT** leave for longer<br>**DO NOT ACCEPT** idea of control |
| | | | **Total** | **15** | |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| 3 | (a) | | transpiration ;<br>xylem ;<br>osmosis ;<br><br>stoma(ta) / stomatal pore ; | 4 | **DO NOT ACCEPT** 'diffusion' alone<br>**ACCEPT** diffusion with osmosis used as qualification<br>**DO NOT ACCEPT** 'pore' or 'guard cells' |
| | | | | | |
| 3 | (b) | (i) | stomata (open to) allow, gaseous exchange / carbon dioxide in / oxygen out / AW ;<br><br>(gaseous exchange) for photosynthesis ;<br>(photosynthesis) essential for plant to, gain energy / make sugars ;<br>some water lost through cuticle ; | 2 max | look for reverse argument<br>**DO NOT ACCEPT** ref to air OR to get gases OR let gases in<br>**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:*<br>reduce water (vapour) **potential gradient** / **diffusion** gradient **;**<br><br>**[A 1]** hairy leaves **;**<br>trap **water vapour** / moisture **;**<br><br>**[A 2] stomata,** in pits / sunken **;**<br>pits trap, **water vapour** / moisture **;**<br><br>**[A 3]** rolled leaves / presence of **hinge cells ;**<br>reduce **surface area** OR (rolled leaves) trap **water vapour** / moisture **;**<br><br>**[A 4]** high solute concentration in cells **;**<br>reduces water potential inside leaf cells **;**<br><br>**[A 5]** thick(er) **cuticle ;**<br>(which is) waterproof / (relatively) **impermeable ;**<br><br>**[A 6]** small leaves / **needles ;**<br>smaller **surface area ;**<br><br>**[A 7]** fewer **stomata ;**<br>reduces **diffusion** (of water vapour) **;**<br><br>**[A 8] stomata** close, during the day **;**<br>reduces **diffusion** (of water vapour) **;**<br><br>**[A 9]** most **stomata** on lower surface **;**<br>less exposure to sun OR cooler OR reduces diffusion (of water vapour) **;** | | ***MARK FIRST <u>TWO</u> ADAPTATIONS <u>ONLY</u>***<br>**ALLOW** max 2 for adaptation [A] marks<br><br>Explanation must be linked to an appropriate statement of adaptation. Allow an explanation mark even if adaptation mark not awarded.<br><br>**DO NOT ACCEPT ‘**water’ for ‘water vapour’ throughout<br>**DO NOT ACCEPT** ‘transpiration’ for diffusion of water vapour throughout<br>**DO NOT ACCEPT** surface area to volume ratio<br><br>**ACCEPT ‘**spines’<br>**DO NOT ACCEPT** surface area to volume ratio |

| Question | | | Expected Answers | Marks | Additional Guidance |
|---|---|---|---|---|---|
| | | | **[A 10]** more densely packed spongy mesophyll **;**<br>smaller surface area for evaporation (from mesophyll cell surface) **;**<br>4 max<br><br>QWC - technical terms used appropriately and spelt correctly **;**<br>1 | **5 max** | Use three terms from:<br>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<br>**ACCEPT** any figure(s) in range 10 – 100 μm |
| | | | (ribosomes) 18**nm** ; | | | **ACCEPT** any figure(s) in range 10 – 20 nm<br>**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*)<br><br>chromosomes / chromatids (in cell division) ;<br>(cytoplasm in) cytokinesis ;<br>organelles / named organelle ;<br><br>RNA (in protein synthesis) ;<br>proteins ; | | 2 max | **DO NOT ACCEPT** mitosis / cell division<br><br>e.g. centriole / vesicle / lysosome / mitochondrion / chloroplast / ribosome<br><br>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:<br>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<br>**DO NOT ACCEPT** refs to DNA replication<br>**IGNORE** ref. to respiration<br>**ACCEPT** named steps in protein synthesis |
| 5 | (b) | (ii) | mutation / faulty DNA produced / error in copying **;**<br>daughter cells will not receive identical genetic information **;**<br>proteins / (daughter) cells, not made / do not function **;** | 2 | **ACCEPT ‘**daughter cells will not be clones’<br>**ACCEPT ‘**proteins / daughter cells function differently’ |
| 5 | (c) | | haploid / half genetic information / chromosome number is n **;**<br><br>genetic information not identical / produces genetically different cells **;**<br>4 cells produced **;** | 2 max | **ACCEPT** use of comparative chromosome numbers as example<br>**DO NOT ACCEPT** identical / not identical without ‘genetic’<br>**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<br>**DO NOT ACCEPT** atrial or systolic pressure | |
| 6 | (b) | (i) | *correct answer = two marks*<br>75 ; ;<br>*if answer incorrect **ALLOW** one mark for correct working*<br>60 / 0.8 | 2 | | |
| 6 | (b) | (ii) | pressure in **ventricle** is below (pressure in) **atrium** ;<br>**bicuspid** / **atrioventricular** valve, open(s) ;<br>blood flows into (atrium and) ventricle ;<br>max 3<br>QWC - technical terms used appropriately and spelt correctly ;<br>1 | 4 | ORA<br>**ACCEPT** mitral<br>**DO NOT ACCEPT** pushed or pumped<br>**DO NOT ACCEPT** arterioventricular<br>Use three terms in correct biological context from: ventricle / ventricular, atrium / atrial, bicuspid, mitral, atrioventricular, diastole | |
| | | | **Total** | 8 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **Paper Total** | 60 | | |