

GCE

Biology

Unit **F211**: Cells, Exchange and Transport

Advanced Subsidiary GCE

Mark Scheme for June 2016

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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.

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Annotations

<i>Annotation</i>	<i>Description</i>
	Point already given (i.e. Given max)
	Underline (for ambiguous / contradictory wording)
	Ignore
	Correct response
	Omission
	Marking point partially met
	Benefit of doubt not given
	Irrelevant response
	Error carried forward
	Contradiction
	Incorrect response

Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	Separates marking points
reject	Answers which are not worthy of credit
not	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
()	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

Question		Expected Answers	Marks	Additional Guidance
1	(a)	(cell) very small OR large surface area to volume ratio ; short diffusion pathway ; <i>idea that</i> diffusion sufficient / fast enough, to supply (all) needs ;	max 2	IGNORE low, activity / metabolic rate IGNORE not very big / small (unless qualified) ACCEPT microscopic ACCEPT larger SA:Vol (ratio)
	(b)	<u>nucleus</u> ; (contractile / food) vacuole ;	max 1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
	(c)	(i) phospholipids / phospholipid bilayer ;	1	Mark the first answer. IGNORE cholesterol DO NOT CREDIT phosphate / heads ACCEPT phospholipid tails / lipid tails / fatty acids

Question	Expected Answers	Marks	Additional Guidance
	<p>(ii)</p> <p>control what, enters / leaves, the organelles ;</p> <p>(contains receptors to) detect changes in environment ;</p> <p>compartmentalisation ;</p> <p>site for, enzymes / electron carriers / components of metabolic pathways ;</p> <p>create concentration gradients ;</p> <p>form pseudopodia ;</p>	<p>max 2</p>	<p>Mark the first two answers. If two correct responses are given followed by one or two incorrect responses or which contradict the correct answers then = 1 or 0 marks</p> <p>IGNORE ref to control of materials entering / leaving <u>cell</u> / ref. to barrier with outside</p> <p>ACCEPT cell, communication / signalling / recognition</p> <p>ACCEPT separate, organelles/ DNA / food / enzymes, (from cytoplasm) separate organelles from each other formation of , vesicles / vacuoles hold water separate metabolic pathways</p> <p>IGNORE ref to increases surface area</p>
(d)	(i) <u>exocytosis</u> ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>DO NOT CREDIT pinocytosis / pino(exocytosis)</p>

Question	Expected Answers	Marks	Additional Guidance
(ii)	burst / lysis / plasma membrane would rupture ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT haemolysis DO NOT CREDIT plasmolysis
(e)	WP of -100 solution higher than -400 / ORA ; (at -100kPa) water potential gradient steeper / described / ORA ; (at -100kPa) water enters Amoeba more quickly / ORA ;	max 2	IGNORE refs to hyper / hypo tonic solutions ACCEPT -100 less negative than -400 Note: response must contain clear ref to both -100 solution and -400 solution ACCEPT more water enters Note: ref to osmosis being more rapid only valid if direction of water movement is clear
	Total	10	

Question	Expected Answers	Marks	Additional Guidance
2 (a)	(ability to continue) dividing ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
(b)	move / waft / sweep, mucus ; produce / release / secrete , mucus ; constrict the (named) airways ; provide, thin barrier / short diffusion distance ;	4	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks DO NOT CREDIT excrete CREDIT narrows lumen / reduces diameter of airway IGNORE controls, diameter / air flow IGNORE smooth lining / <i>reduces</i> diffusion distance IGNORE thin, surface / cells, for diffusion
(c)	transport / movement / mass flow, of, assimilates / sucrose / amino acids ; from source to sink / description ;	2	IGNORE ref to (organic) solutes / food / glucose / sugars e.g. from cells / tissues / site where produced to cells / tissues / site where used ACCEPT named source AND sink
	Total	7	

Question		Expected Answers	Marks	Additional Guidance
3	(a)	Z ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
	(b)	Fig. 3.1(a) (no mark) shows surface view ; 3D / three dimensional ; better <u>resolution</u> (than b) ;	max 2	Please place a green blob on paper Do not allow mp 2 if fig 3.1 b selected Do not allow mp 3 if fig 3.1 b selected Must be comparative comment
	(c)	cell walls ; plasmodesma(ta) ; endodermis / endodermal ; Casparian strip ;	4	DO NOT CREDIT Caspian / Caspiran
	(d) (i)	C ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
	(ii)	small(er) <u>surface area</u> means less, evaporation / transpiration ;	1	Mark independent of (d)(i) Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks IGNORE less water loss / fewer stomata DO NOT CREDIT small surface area to volume ratio DO NOT CREDIT no, transpiration / evaporation

Question	Expected Answers	Marks	Additional Guidance
	<p>(iii) <u>thick</u> (waxy) cuticle ; few stomata ; stomata, sunken / in pits ; hairs / hairy ; leaf, curled / rolled ; dense spongy mesophyll ; closure of stomata, during day / when water availability low ;</p>	max 1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p>
	<p>(e) water <u>vapour</u> around the, stomata / leaf surface, is blown away;</p> <p>reduces water (vapour) potential around, <u>stomata</u> ;</p> <p><i>idea of:</i> increases / maintains, water (vapour) potential gradient (between air space in leaf and outside) ;</p>	max 2	<p>IGNORE moisture (for all mark points) ACCEPT boundary layer reduced ACCEPT evaporated water as water vapour</p> <p>ACCEPT relative humidity for water potential</p> <p>IGNORE diffusion gradient / concentration gradient</p>
Total		12	

Question		Expected Answers	Marks	Additional Guidance
4	(a)	create / provide / increase contrast ; make, cells / (named) component(s), visible OR cells / (named) components, can be, identified / distinguished / differentiated ;	2	IGNORE clearer ACCEPT (named) organelle(s) stand out from surroundings ACCEPT regions / parts / AW, of cell
	(b)	(i) anaphase ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks

Question	Expected Answers	Marks	Additional Guidance
	<p>(ii)</p> <p>1. chromosomes coil / supercoil / condense ;</p> <p>2. nuclear envelope disintegrates ;</p> <p>3. nucleolus, no longer visible / disappears ;</p> <p>4. centrioles move to opposite, ends of cell / poles ;</p> <p>5. chromosomes attached to spindle fibres at centromere ;</p> <p>6. chromosomes align at equator ;</p> <p>7. chromosomes move towards opposite, poles / ends of cell ;</p> <p>8. spindle fibres change length / shorten ; max 4</p> <p>QWC ; max 1</p>	<p>max 5</p>	<p>ACCEPT chromatid for chromosome throughout Note: There is no mark for naming phases, but if phase is mentioned and description is incorrect for named phase then DO NOT CREDIT Accept mp 1-5 in prophase, mp 6 metaphase, mp 7 anaphase mp 8 in any phase IGNORE ref to events in telophase and cytokinesis, as they occur <i>after</i> anaphase</p> <p>ACCEPT chromatin</p> <p>ACCEPT nuclear membrane IGNORE dissolves</p> <p>DO NOT CREDIT pairs of chromosomes line up ACCEPT pairs of chromatids line up</p> <p>IGNORE spindle fibres contract</p> <p>Place a green blob next to each word and a tick next to the pencil. Award if any two terms spelt correctly and used in correct context from: chromosomes / chromatids / chromatin supercoil nucleolus condense centromere nuclear envelope (but not membrane) centriole pole spindle equator</p>

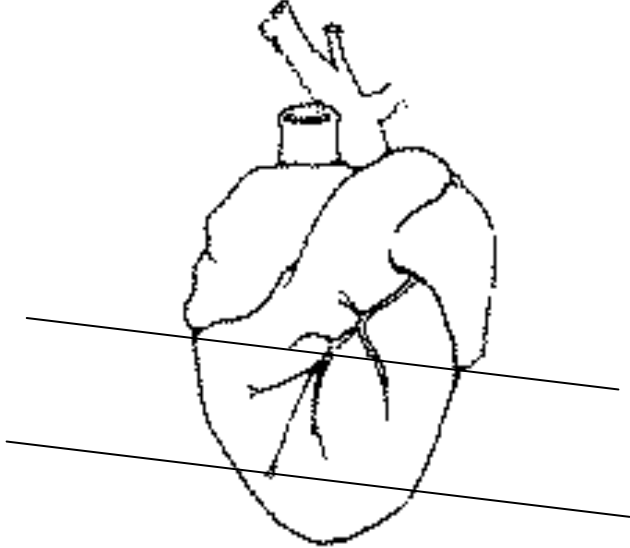
Question	Expected Answers	Marks	Additional Guidance
(c)	<p>DNA / genetic material, replicated / synthesised / checked ;</p> <p>cell growth / increased respiration / protein synthesis / increase in number of organelles ;</p> <p>cytokinesis / cell surface membrane constricts / cytoplasm splits in two / cell plate forms (plants) ;</p> <p>ref to G and S phases ;</p>	max 3	<p>For mp 1 & 2 where candidates link events to S & G phases then description must be correct for phase. S phase is DNA synthesis only G phases contain protein synthesis, increasing numbers of organelles, growth, increased respiration and checking of DNA.</p> <p>IGNORE chromosomes replicate / DNA copied / DNA doubles</p> <p>ACCEPT more ATP</p> <p>ACCEPT Gap or 'growth' for G and Synthesis for S throughout ACCEPT in context of diagram</p>
Total		11	

Question		Expected Answers	Marks	Additional Guidance
5	(a)	<p>must remain small OR cannot grow tall / large / big ;</p> <p>no support from vascular tissues / vascular bundles / xylem ;</p> <p>use only diffusion / no mass flow / no rapid transport ;</p> <p>diffusion too slow (to enable substances to move large distances) ;</p> <p>idea of: short diffusion pathway / large surface area to volume ratio ;</p>	Max 2	

Question	Expected Answers	Marks	Additional Guidance												
(b)	<p>1. <i>idea of</i> water lost by evaporation / transpiration / evapotranspiration ;</p> <p>2. (water moves by) symplast and apoplast pathways ;</p> <p>3. through / along cell walls by, capillary action / adhesion (apoplast pathway) ;</p> <p>1. (water loss) reduces the water potential of (leaf) cells ;</p> <p>2. water moves from higher water potential to lower water potential / <u>down</u> water potential gradient (symplast pathway) ;</p> <p>3. by osmosis (symplast pathway) ;</p> <p>4. through plasmodesmata (symplast pathway) ; max 3</p> <p>QWC ; max 1</p>	<p>max 4</p>	<p>DO NOT CREDIT mp 2 – 7 in context of water uptake</p> <p>DO NOT CREDIT mp 3-7 in context of movement in xylem either stated or implied</p> <p>AWARD only where it is clear that the movement is in context of apoplast.</p> <p>ACCEPT ψ</p> <p>IGNORE osmosis if used in context of apoplast pathway</p> <p>Place a green blob next to each word and a tick next to the pencil. Award if any two terms spelt correctly and used in correct context from:</p> <table border="0"> <tr> <td>apoplast</td> <td>osmosis</td> </tr> <tr> <td>symplast</td> <td>adhesion</td> </tr> <tr> <td>capillary action</td> <td>plasmodesmata</td> </tr> <tr> <td>evaporation (allow correct derivatives)</td> <td></td> </tr> <tr> <td>transpiration</td> <td>evapotranspiration</td> </tr> <tr> <td>water potential</td> <td>water potential gradient</td> </tr> </table>	apoplast	osmosis	symplast	adhesion	capillary action	plasmodesmata	evaporation (allow correct derivatives)		transpiration	evapotranspiration	water potential	water potential gradient
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Question		Expected Answers	Marks	Additional Guidance
	(c) (i)	group of cells ; working together / performing a function ;	2	ACCEPT cells derived from same stem cell source
	(ii)	palisade (mesophyll) ; spongy mesophyll ; guard cells ; (upper / lower) epidermal cells ; AVP ;	2 max	Mark the first two answers. If two correct responses are given followed by one or two incorrect responses or which contradict the correct answers then = 1 or 0 marks e.g. parenchyma, collenchyma, sclerenchyma
		Total	10	

Question		Expected Answers	Marks	Additional Guidance
6	(a)	$14\,000 / 120 = 117\ \mu\text{m} ; ;$	2	<p>length of line A-B = 14mm / 14000 μm</p> <p>Correct answer = 2 marks. Allow one mark if correct working shown including units for cm & mm e.g. 1.4 cm / 120 14 mm / 120 14000 / 120</p> <p>If answer = 125 μm allow one mark for correct working but incorrect measurement (15mm instead of 14)</p> <p>Allow one mark if not rounded to nearest micrometre</p>
	(b)	<p>F ;</p> <p>A ;</p> <p>B or D ;</p> <p>E ;</p>	4	

Question		Expected Answers	Marks	Additional Guidance
	(c) (i)	a line drawn across the ventricles ;	1	<p>ACCEPT any line between those shown below</p> 
	(ii)	<p>K = right ventricle ;</p> <p>L = (interventricular) septum ;</p> <p>M = (left) ventricle wall / cardiac muscle / myocardium ;</p>	3	<p>ACCEPT septem</p> <p>IGNORE ventricle</p>
Total			10	

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