



GCE

Biology

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

Advanced Subsidiary GCE

Mark Scheme for June 2015

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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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Abbreviations, annotations and conventions used in the detailed Mark Scheme.

- / = alternative and acceptable answers for the same marking point
- (1) = separates marking points
- DO NOT CREDIT** = answers which are not worthy of credit
- IGNORE** = statements which are irrelevant
- CREDIT** = answers that can be accepted
- ACCEPT** = answers that can be accepted but which are not the ideal response
- () = words which are not essential to gain credit
- = underlined words must be present in answer to score a mark (correct spelling not essential)
- ecf = error carried forward
- AW = alternative wording
- ora = or reverse argument
- , = indicates need to select from alternatives to complete the marking point

Annotations: the following annotations are available on SCORIS.

- ✓ = correct response
- ✗ = incorrect response
- bod = benefit of the doubt
- nbod = benefit of the doubt **not** given
- ECF = error carried forward
- ^ = information omitted
- I = ignore
- BP = blank page
- = QWC
- GM = given mark
- CON = response that contradicts previous correct response

Highlighting is also available to highlight any particular points on the script.

The following questions should be annotated with ticks to show where marks have been awarded in the body of the text:

ALL QUESTIONS

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Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	Stoma(ta) ;	1	
	(a)	(ii)	<p><i>idea of:</i> unevenly thickened (cell) <u>w</u>all ;</p> <p>able to, change shape / bend ;</p> <p>transport proteins / ion pumps, in plasma membrane ;</p> <p>(presence of) chloroplasts (to provide, ATP / energy) ;</p>	2 max	<p>Statement should be comparative CREDIT wall beside pore thicker / wall is thicker on one side ACCEPT refs to: thick inner and thin outer walls / inner wall thicker / outer wall thinner ACCEPT thickened for thicker</p> <p>CREDIT so can bend DO NOT CREDIT 'contract' 'recoil' 'move' IGNORE functions such as 'open / close stoma' 'flexible' 'expand' 'stretch' 'bulge'</p> <p>ACCEPT mitochondria IGNORE chlorophyll DO NOT CREDIT 'produce / make energy'</p>
	(a)	(iii)	epidermis / cuticle ;	1	<p>Mark the first answer. If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = 0 marks ACCEPT guard cell IGNORE 'surface'</p>

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Question	Expected Answers	Marks	Additional Guidance
(b)	<u>water potential</u> ; <u>osmosis</u> ; selectively / partially / differentially, <u>permeable</u> ; <u>turgidity / turgor (pressure)</u> ;	4	Mark the first answer on each prompt line. If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = 0 marks DO NOT CREDIT water potential gradient IGNORE ψ IGNORE diffusion DO NOT CREDIT semi permeable ACCEPT 'turgidness' IGNORE shape / rigidity / stability

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Question		Expected Answers	Marks	Additional Guidance
	(c)	<p><u>evaporation</u> at top of, plant / xylem ;</p> <p>(creates) tension in <u>xylem</u> ;</p> <p>water <u>molecules</u>, stick together / are cohesive / form a chain or column ;</p> <p>(column / chain) pulled up (by tension);</p>	3 max	<p>IGNORE refs to adhesion / capillarity</p> <p>ACCEPT leaf or named part of leaf</p> <p>IGNORE ref to transpiration / loss of water vapour</p> <p>IGNORE xylem (vessels) under tension</p> <p>CREDIT water molecules, attracted together / (hydrogen) bonded together / form a continuous stream</p> <p>IGNORE column, moves up / sucked up</p> <p>ACCEPT column drawn up</p> <p>ACCEPT description if linked to tension at top e.g. tension at top forces water up</p> <p>DO NOT CREDIT chain 'pushed' up xylem</p>
		Total	11	

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Question		Expected Answers				Marks	Additional Guidance	
2	(a)						<p>Mark the first answer in each box. If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>Award 1 mark for each correct row</p> <p>ACCEPT tick / present & cross / not present / absent / none</p> <p>IGNORE ref to nucleoid</p> <p>CREDIT murein as alternative to peptidoglycan ACCEPT peptidoglycin DO NOT ACCEPT peptoglycan</p> <p>ACCEPT 'on RER' or 'in cytoplasm' for yes ACCEPT ref to size of ribosomes (large / 80S / 22nm in Eukaryotes, small / 70S / 18nm in bacteria)</p>	
			Animal	Plant	Yeast	Bacterium		
					budding			;
		yes	yes	yes	no			;
			cellulose		peptidoglycan	;		
		yes	yes	yes	yes	;		
						4		
	(b)	(i)	<u>meristem</u> (atic) ;				1	IGNORE position in plant such as 'root tip', cambium
	(b)	(ii)	nucleus / nucleolus / chromatin ; cytoplasm ; cross / end, (cell) walls ;				2 max	<p>Read through and award marks for correct features</p> <p>IGNORE ref to other individual organelles / vacuole</p> <p>IGNORE nucleous</p> <p>DO NOT CREDIT 'two nuclei in one cell'</p> <p>CREDIT end plates</p> <p>ACCEPT no end walls / no nucleus / no cytoplasm</p> <p>IGNORE walls between cells</p>

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Question		Expected Answers	Marks	Additional Guidance
	(b) (iii)	<p>thicker ;</p> <p>lignified ;</p> <p>contain (bordered) <u>pits</u> ;</p>	2 max	<p>IGNORE stronger</p> <p>CREDIT have lignin /contain lignin / reinforced with lignin / impregnated with lignin</p> <p>DO NOT CREDIT have lignin on the walls / lined by lignin / surrounded by lignin</p> <p>IGNORE ref to pattern of thickening</p> <p>IGNORE 'pore'</p>
	(c)	<p><u>sieve (tube) element</u> ;</p> <p><u>companion</u> (cell) ;</p> <p>parenchyma ;</p>	2 max	<p>IGNORE 'sieve tube' 'sieve cell'</p> <p>ACCEPT fibres / sclereids / sclerenchyma</p>
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Question		Expected Answers	Marks	Additional Guidance
3	(a) (i)	columnar / ciliated ; squamous / pavement ;	2	Mark the first two answers. IGNORE 'cilia cells'
	(a) (ii)	<p>1. wall is <u>one cell</u> thick for short(er) diffusion, distance / pathway ;</p> <p>2. squamous, cells / epithelium , provide short diffusion distance / pathway ;</p> <p>3. elastic so, recoil / expel air / helps ventilation ;</p> <p>4. create / maintain, concentration gradient / described ;</p> <p>5. large number (of alveoli) provide large(r) surface area ;</p> <p>6. small size (of alveoli) provide large(r) surface area to volume ratio ;</p> <p>7. (cells secrete) surfactant to maintain surface area ; max 4</p>		<p>Mp 1 & 2 the phrase 'for short(er) diffusion distance' only needs to be stated once to gain both marks</p> <p>IGNORE ref to rate of diffusion</p> <p>ACCEPT 'alveolus / epithelium one cell thick' DO NOT CREDIT 'membrane / cell wall, one cell thick'</p> <p>ACCEPT pavement / thin / flat for squamous IGNORE thin wall</p> <p>ACCEPT gas for air IGNORE CO₂ / O₂</p> <p>IGNORE diffusion gradient</p> <p>Take care not to confuse mp 5 & 6 DO NOT CREDIT large in number so large SA:Vol DO NOT CREDIT small so provide large surface area</p> <p>CREDIT SA:Vol</p> <p>ACCEPT surfactant to prevent collapse</p>

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Question		Expected Answers	Marks	Additional Guidance
		QWC ;	max 1	Any two technical terms from the list below used appropriately and spelled correctly : concentration gradient surface area to volume ratio elastic recoil surface area (note: do not allow as part of 'surface area to volume ratio') diffusion (note: do not allow as part of 'diffusion gradient') squamous ventilation
			5 max	
(b)	(i)	<u>spirometer</u> ;	1	DO NOT CREDIT respirometer IGNORE trace
	(ii)	13.5 ;	1	ACCEPT 13 or 14
	(iii)	0.5 ; ;	2	Correct answer = 2 marks If answer incorrect allow one mark for: either 3.6 – 3.1 (measured from peaks) OR 2.7 – 2.2 (measured from troughs) ECF one mark for final answer if candidate has used 3.5 as the initial reading (3.5 – 3.1 = 0.4 for 1 mark) For candidates who have measured over less than a minute and divided by number of seconds: ACCEPT for two marks 0.56 if measured peaks 0.52 if measured troughs ACCEPT working (3.6 – 3.1) x 60 / 54 for peaks OR (2.7 – 2.2) x 60 / 58 for troughs
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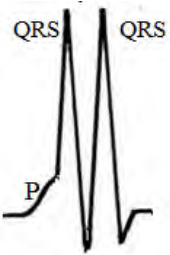
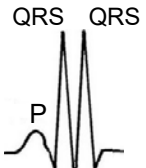

Question		Expected Answers	Marks	Additional Guidance
4	(a)	<p>phospholipid bilayer containing proteins ;</p> <p>head / hydrophilic region, facing outwards OR tail / hydrophobic region, facing inwards ;</p> <p>ref to intrinsic and extrinsic (glyco)proteins / described ;</p> <p><i>idea of:</i> glycoproteins / glycolipids, sticking out (of bilayer / membrane);</p> <p>cholesterol, inside bilayer / between phospholipids ;</p>	3 max	<p>Marks can be awarded for an annotated diagram IGNORE ref to 'fluid mosaic model' ACCEPT glycoprotein / channel protein / carrier protein / etc. for protein</p> <p>DO NOT CREDIT ref to hydrophobic heads or hydrophilic tails</p> <p>ACCEPT transmembrane for intrinsic and on surface for extrinsic</p> <p>IGNORE ref to functions such as 'carrier / channel' etc.</p> <p>IGNORE glycoproteins / glycolipids are, extrinsic / on the outside / on surface</p> <p>CREDIT between fatty acid tails</p>
	(b) (i)	<p><u>active</u> transport / uptake ;</p> <p>(transport / carrier) protein ;</p>	2	<p>Mark the first answer on each prompt line. If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT intrinsic protein / transmembrane protein DO NOT CREDIT channel protein / extrinsic protein</p>
	(b) (ii)	<p>not permeable to, ammonia / NH₃ / ammonium / NH₄⁺ ;</p>	1	<p>Response must be specific to permeability to ammonia CREDIT ammonia cannot pass through membrane ACCEPT selectively permeable so does not allow passage of ammonia (into the cells) IGNORE 'selectively / partially, permeable' unqualified IGNORE 'not permeable to alkalis'</p>

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Question		Expected Answers	Marks	Additional Guidance
5	(a)	C; E; A; B;	4	

Question	Expected Answers	Marks	Additional Guidance
(b) (i)	<p>P wave combined with larger peak before QRS complex ;</p> 	1	<p>Note:</p> <ul style="list-style-type: none"> - look for additional QRS peak between P and original QRS peak - new peak may be merged with P but there must still be evidence of P <p>IGNORE relative size and width of two QRS peaks IGNORE anything drawn after second QRS IGNORE small gap / 'bump' between two QRS peaks</p> <p>ACCEPT two QRS peaks drawn immediately after P peak if no delay between P and first QRS IGNORE relative size and width of two QRS peaks IGNORE anything drawn after second QRS IGNORE small gap / bump between two QRS peaks</p>  <p>DO NOT CREDIT two QRS with no sign of a P peak trace with gap between P and first QRS</p> 

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Question		Expected Answers	Marks	Additional Guidance
	(b) (ii)	<p>lower output / less blood leaves heart (for each ventricular contraction) ;</p> <p><i>idea of:</i> ventricles do not have time to fill (before contracting) ;</p> <p>OR</p> <p>ventricle contraction inefficient because first contraction is downwards</p>	2	<p>ACCEPT less goes around body</p> <p>CREDIT 'heart pumps less blood' 'blood flow reduced'</p> <p>e.g. ventricle(s) not full before contracting</p> <p>e.g. atria unable to, contract / empty, before ventricles contract</p> <p>IGNORE ref to change in pressure & rate of flow (question asks about blood flow)</p>
	(c) (i)	<p>lungs not, functioning / filled with air ;</p> <p>blood / haemoglobin, is, not oxygenated in the lungs / oxygenated in placenta ;</p> <p>(therefore) pulmonary circuit / lungs, bypassed ;</p>	2 max	<p>ACCEPT fetus not breathing</p> <p>ACCEPT ref to 'single circulation'</p> <p>ACCEPT little blood goes to, lungs / pulmonary circuit</p> <p>DO NOT ACCEPT no blood goes to lungs</p>

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Question		Expected Answers	Marks	Additional Guidance
(c)	(ii)	<p>EITHER <i>Difference:</i> (fetal haemoglobin) higher affinity for oxygen / described /</p> <p style="text-align: right;">ORA ;</p> <p><i>Reason:</i> (fetal haemoglobin) must be able to bind to oxygen, in low(er) partial pressure / in placenta / when adult oxyhaemoglobin dissociates / when adult haemoglobin dissociates from oxygen;</p> <p>OR</p> <p><i>Difference:</i> (fetal haemoglobin) contains gamma sub-units ;</p> <p><i>Reason:</i> creates high(er) affinity for oxygen ;</p>	2	<p>ACCEPT able to become more saturated than adult haemoglobin at low pO_2</p> <p>IGNORE gets more saturated at low pO_2 (ie no comparison to adult haemoglobin)</p> <p>IGNORE ref to saturation curve</p> <p>CREDIT 'associate with / combine with / loads' for bind</p> <p>IGNORE pick up / take up / gains / absorbs / attracts / attaches / saturates</p> <p>DO NOT CREDIT oxygen dissociates or haemoglobin dissociates</p>
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Question	Expected Answers	Marks	Additional Guidance
6 (a)	<p>transport / synthesis / metabolism, of, fats / lipids / steroid (hormones) / carbohydrates ;</p> <p>contain (hydrolysing) enzymes OR break down / digest, (named) organelles / cells / (named) pathogens ;</p> <p>protein synthesis ;</p>	3	<p>Mark the first answer in each box. If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>CREDIT 'processes' 'packages' ACCEPT 'processes toxins'</p> <p>DO NOT CREDIT 'are, hydrolysing / digestive enzymes' 'produce enzymes' IGNORE ref to 'harmful substances' 'waste materials' 'phagocytosis' 'secretes enzymes'</p> <p>CREDIT ref to translation</p>
	<p>(b)</p> <p><input checked="" type="checkbox"/> ;</p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> ;</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input checked="" type="checkbox"/> ;</p>	3	<p>If four ticks given reduce mark by 1 If five ticks given reduce mark by 2 If six ticks given reduce mark by 3 For each mark reduction annotate with 'CON'</p>
	Total	6	

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