

**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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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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**

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

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	<b>Mark the first answer on each prompt line.</b> If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b>  <b>DO NOT CREDIT</b> water potential gradient <b>IGNORE</b> $\Psi$  <b>IGNORE</b> diffusion  <b>DO NOT CREDIT</b> semi permeable  <b>ACCEPT</b> 'turgidness' <b>IGNORE</b> shape / rigidity / stability

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><b>IGNORE</b> refs to adhesion / capillarity</p> <p><b>ACCEPT</b> leaf or named part of leaf</p> <p><b>IGNORE</b> ref to transpiration / loss of water vapour</p> <p><b>IGNORE</b> xylem (vessels) under tension</p> <p><b>CREDIT</b> water molecules, attracted together / (hydrogen) bonded together / form a continuous stream</p> <p><b>IGNORE</b> column, moves up / sucked up</p> <p><b>ACCEPT</b> column drawn up</p> <p><b>ACCEPT</b> description if linked to tension at top e.g. tension at top forces water up</p> <p><b>DO NOT CREDIT</b> chain 'pushed' up xylem</p>
		<b>Total</b>	<b>11</b>	

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

Question			Expected Answers	Marks	Additional Guidance
	(b)	(iii)	thicker ;  lignified ;   contain (bordered) <u>pits</u> ;	2 max	<b>IGNORE</b> stronger  <b>CREDIT</b> have lignin /contain lignin / reinforced with lignin / impregnated with lignin <b>DO NOT CREDIT</b> have lignin on the walls / lined by lignin / surrounded by lignin <b>IGNORE</b> ref to pattern of thickening  <b>IGNORE</b> 'pore'
	(c)		<u>sieve</u> (tube) <u>element</u> ;  <u>companion</u> (cell) ;  parenchyma ;	2 max	<b>IGNORE</b> 'sieve tube' 'sieve cell' <b>ACCEPT</b> fibres / sclereids / sclerenchyma
			<b>Total</b>	<b>11</b>	



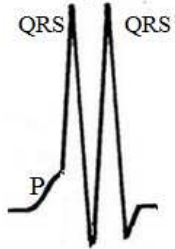
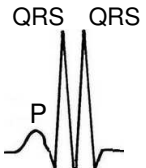

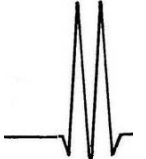

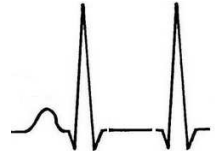
Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	columnar / ciliated ; squamous / pavement ;	2	Mark the first two answers. IGNORE 'cilia cells'
	(a)	(ii)	<p>1.wall is <u>one cell</u> thick for short(er) <b>diffusion</b>, distance / pathway ;</p> <p>2.<b>squamous</b>, cells / epithelium , provide short diffusion distance / pathway ;</p> <p>3.<b>elastic</b> so, <b>recoil</b> / expel air / helps <b>ventilation</b> ;</p> <p>4.create / maintain, <b>concentration</b> <b>gradient</b> / described ;</p> <p>5.large number (of alveoli) provide large(r) <b>surface area</b> ;</p> <p>6.small size (of alveoli) provide large(r) <b>surface area to volume ratio</b> ;</p> <p>7.(cells secrete) surfactant to maintain surface area ; <b>max 4</b></p>		<p>Mp 1 &amp; 2 the phrase 'for short(er) diffusion distance' only needs to be stated once to gain both marks</p> <p><b>IGNORE</b> ref to rate of diffusion</p> <p><b>ACCEPT</b> 'alveolus / epithelium one cell thick' <b>DO NOT CREDIT</b> 'membrane / cell wall, one cell thick'</p> <p><b>ACCEPT</b> pavement / thin / flat for squamous <b>IGNORE</b> thin wall</p> <p><b>ACCEPT</b> gas for air <b>IGNORE</b> CO<sub>2</sub> / O<sub>2</sub></p> <p><b>IGNORE</b> diffusion gradient</p> <p>Take care not to confuse mp 5 &amp; 6 <b>DO NOT CREDIT</b> large in number so large SA:Vol <b>DO NOT CREDIT</b> small so provide large surface area</p> <p><b>CREDIT</b> SA:Vol</p> <p><b>ACCEPT</b> surfactant to prevent collapse</p>

Question			Expected Answers	Marks	Additional Guidance
			<b>QWC ;</b>	<b>max 1</b>	Any <b>two</b> technical terms from the list below used appropriately and spelled correctly :  <b>concentration gradient</b> <b>surface area to volume ratio</b> <b>elastic recoil</b> <b>surface area</b> (note: do not allow as part of 'surface area to volume ratio') <b>diffusion</b> (note: do not allow as part of 'diffusion gradient') <b>squamous ventilation</b>
				5 max	
	(b)	(i)	<u>spirometer</u> ;	1	<b>DO NOT CREDIT</b> respirometer <b>IGNORE</b> trace
		(ii)	13.5 ;	1	<b>ACCEPT</b> 13 or 14
		(iii)	0.5 ; ;		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)  <b>ECF</b> one mark for final answer if candidate has used 3.5 as the initial reading (3.5 – 3.1 = 0.4 for 1 mark)  <b>For candidates who have measured over less than a minute and divided by number of seconds:</b> <b>ACCEPT for two marks</b> 0.56 if measured peaks 0.52 if measured troughs <b>ACCEPT</b> working (3.6 – 3.1) x 60 / 54 for peaks OR (2.7 – 2.2) x 60 / 58 for troughs
				2	
			<b>Total</b>	<b>11</b>	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		<p>phospholipid bilayer containing proteins ;</p> <p>head / hydrophilic region, facing outwards <b>OR</b> tail / hydrophobic region, facing inwards ;</p> <p>ref to intrinsic <b>and</b> 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><b>Marks can be awarded for an annotated diagram</b> <b>IGNORE</b> ref to 'fluid mosaic model' <b>ACCEPT</b> glycoprotein / channel protein / carrier protein / etc. for protein</p> <p><b>DO NOT CREDIT</b> ref to hydrophobic heads or hydrophilic tails</p> <p><b>ACCEPT</b> transmembrane for intrinsic <b>and</b> on surface for extrinsic</p> <p><b>IGNORE</b> ref to functions such as 'carrier / channel' etc.</p> <p><b>IGNORE</b> glycoproteins / glycolipids are, extrinsic / on the outside / on surface</p> <p><b>CREDIT</b> between fatty acid tails</p>
	(b)	(i)	<p><u>active</u> transport / uptake ;</p> <p>(transport / carrier) protein ;</p>	2	<p><b>Mark the first answer on each prompt line.</b> If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>ACCEPT</b> intrinsic protein / transmembrane protein <b>DO NOT CREDIT</b> channel protein / extrinsic protein</p>
	(b)	(ii)	<p>not permeable to, ammonia / <math>\text{NH}_3</math> / ammonium / <math>\text{NH}_4^+</math> ;</p>	1	<p>Response must be specific to permeability to ammonia <b>CREDIT</b> ammonia cannot pass through membrane <b>ACCEPT</b> selectively permeable so does not allow passage of ammonia (into the cells) <b>IGNORE</b> 'selectively / partially, permeable' unqualified <b>IGNORE</b> 'not permeable to alkalis'</p>

Question			Expected Answers	Marks	Additional Guidance
(b)	(iii)		<p><b>phospholipids</b> / (named) molecules, vibrate more / move around more / have more <b>kinetic energy</b> ;</p> <p>increases, size / number, of gaps, in membrane / between phospholipids ;</p> <p><b>bilayer</b>, becomes more fluid / melts ;</p> <p>proteins / glycoproteins, <b>denatured</b> ;</p> <p style="text-align: right;"><b>max 3</b></p>		<p><b>IGNORE</b> refs to increase in permeability / leaky as the question asks about structure not properties</p> <p><b>CREDIT</b> creates gaps in membrane <b>ACCEPT</b> holes for gaps <b>IGNORE</b> ref to pores, ref to gaps created by proteins denaturing</p> <p><b>IGNORE</b> membrane / phospholipids become more fluid</p> <p><b>ACCEPT</b> description of denaturing e.g. 3D shape / tertiary structure, changes <b>IGNORE</b> enzymes denature , ref to active site</p>
			<p><b>QWC</b> ;</p> <p style="text-align: right;"><b>max 1</b></p>	4 max	<p>Any <b>two</b> technical terms from the list below used appropriately and spelled correctly :</p> <div style="display: flex; justify-content: space-between;"> <span><b>phospholipid(s)</b></span> <span><b>bilayer</b></span> </div> <p><b>kinetic energy</b> (ref to molecules - do not credit in ref to membrane or cell)</p> <p><b>denature(d)</b> (must refer to proteins or glycoproteins)</p>
			<b>Total</b>	<b>10</b>	

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> 		<p><b>Note:</b></p> <ul style="list-style-type: none"><li>- look for additional QRS peak between P and original QRS peak</li><li>- new peak may be merged with P but there must still be evidence of P</li></ul> <p><b>IGNORE</b> relative size and width of two QRS peaks <b>IGNORE</b> anything drawn after second QRS <b>IGNORE</b> small gap / 'bump' between two QRS peaks</p> <p><b>ACCEPT</b> two QRS peaks drawn immediately after P peak if no delay between P and first QRS <b>IGNORE</b> relative size and width of two QRS peaks <b>IGNORE</b> anything drawn after second QRS <b>IGNORE</b> small gap / bump between two QRS peaks</p>   <p><b>DO NOT CREDIT</b> two QRS with no sign of a P peak trace with gap between P and first QRS</p>   
				1	

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><b>ACCEPT</b> less goes around body</p> <p><b>CREDIT</b> '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><b>IGNORE</b> ref to change in pressure &amp; 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><b>ACCEPT</b> fetus not breathing</p> <p><b>ACCEPT</b> ref to 'single circulation'</p> <p><b>ACCEPT</b> little blood goes to, lungs / pulmonary circuit</p> <p><b>DO NOT ACCEPT</b> no blood goes to lungs</p>

Question			Expected Answers	Marks	Additional Guidance
	(c)	(ii)	<p><b>EITHER</b>  <i>Difference:</i> (fetal haemoglobin) higher affinity for oxygen / described /</p> <p style="text-align: right;"><b>ORA ;</b></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><b>OR</b></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><b>ACCEPT</b> able to become more saturated than adult haemoglobin at low <math>pO_2</math></p> <p><b>IGNORE</b> gets more saturated at low <math>pO_2</math> (ie no comparison to adult haemoglobin)</p> <p><b>IGNORE</b> ref to saturation curve</p> <p><b>CREDIT</b> 'associate with / combine with / loads' for bind</p> <p><b>IGNORE</b> pick up / take up / gains / absorbs / attracts / attaches / saturates</p> <p><b>DO NOT CREDIT</b> oxygen dissociates or haemoglobin dissociates</p>
			<b>Total</b>	<b>11</b>	



Question		Expected Answers	Marks	Additional Guidance
6	(a)	<p>transport / synthesis / metabolism, of, fats / lipids / steroid (hormones) / carbohydrates ;</p> <p>contain (hydrolysing) enzymes <b>OR</b> break down / digest, (named) organelles / cells / (named) pathogens ;</p> <p>protein synthesis ;</p>	3	<p><b>Mark the first answer in each box.</b> If the answer is correct and a further answer is given that is incorrect or contradicts the correct answer then = <b>0 marks</b></p> <p><b>CREDIT</b> 'processes' 'packages' <b>ACCEPT</b> 'processes toxins'</p> <p><b>DO NOT CREDIT</b> 'are, hydrolysing / digestive enzymes' 'produce enzymes' <b>IGNORE</b> ref to 'harmful substances' 'waste materials' 'phagocytosis' 'secretes enzymes'</p> <p><b>CREDIT</b> ref to translation</p>
	(b)	<div><input checked="" type="checkbox"/> ;</div> <div><input type="checkbox"/></div> <div><input checked="" type="checkbox"/> ;</div> <div><input type="checkbox"/></div> <div><input type="checkbox"/></div> <div><input checked="" type="checkbox"/> ;</div>	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>
		<b>Total</b>	<b>6</b>	

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