OCR
Oxford Cambridge and RSA

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**

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	Stoma(ta) **;**	1	
	(a)	(ii)	*idea of:* unevenly thickened (cell) wall **;**		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
			able to, change shape / bend **;**		**CREDIT** so can bend **DO NOT CREDIT** 'contract' 'recoil' 'move' **IGNORE** functions such as 'open / close stoma' 'flexible' 'expand' 'stretch' 'bulge'
			transport proteins / ion pumps, in plasma membrane **;**		
			(presence of) chloroplasts (to provide, ATP / energy) **;**	2 max	**ACCEPT** mitochondria **IGNORE** chlorophyll **DO NOT CREDIT** 'produce / make energy'
	(a)	(iii)	epidermis / cuticle **;**	1	**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'

Question			Expected Answers	Marks	Additional Guidance
	(b)				**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**
			water potential **;**		**DO NOT CREDIT** water potential gradient **IGNORE** Ψ
			osmosis **;**		**IGNORE diffusion**
			selectively / partially / differentially, permeable **;**		**DO NOT CREDIT** semi permeable
			turgidity / turgor (pressure) **;**	4	**ACCEPT** 'turgidness' **IGNORE** shape / rigidity / stability

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

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td>
<table>
<tr><th>Animal</th><th>Plant</th><th>Yeast</th><th>Bacterium</th></tr>
<tr><td></td><td></td><td>budding</td><td></td></tr>
<tr><td>yes</td><td>yes</td><td>yes</td><td>no</td></tr>
<tr><td></td><td>cellulose</td><td></td><td>peptidoglycan</td></tr>
<tr><td>yes</td><td>yes</td><td>yes</td><td>yes</td></tr>
</table>
;
;
;
;</td><td>4</td><td>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

Award 1 mark for each correct row

ACCEPT tick / present & cross / not present / absent / none

IGNORE ref to nucleoid

CREDIT murein as alternative to peptidoglycan
ACCEPT peptidoglycin
DO NOT ACCEPT peptoglycan

ACCEPT ‘on RER’ or ‘in cytoplasm’ for yes
ACCEPT ref to size of ribosomes (large / 80S / 22nm in Eukaryotes, small / 70S / 18nm in bacteria)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><u>meristem</u>(atic)<u></u> ;</td><td>1</td><td>IGNORE position in plant such as ‘root tip’, cambium</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(ii)</td><td>nucleus / nucleolus / chromatin ;

cytoplasm ;

cross / end, (cell) walls ;</td><td>2 max</td><td>Read through and award marks for correct features
IGNORE ref to other individual organelles / vacuole
IGNORE nucleous
DO NOT CREDIT ‘two nuclei in one cell’

CREDIT end plates
ACCEPT no end walls / no nucleus / no cytoplasm
IGNORE walls between cells</td></tr>
</table>

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

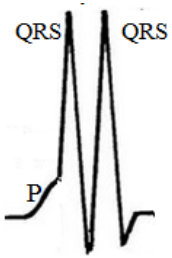
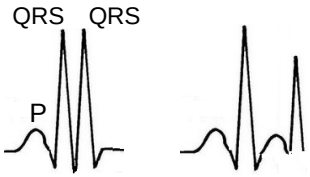
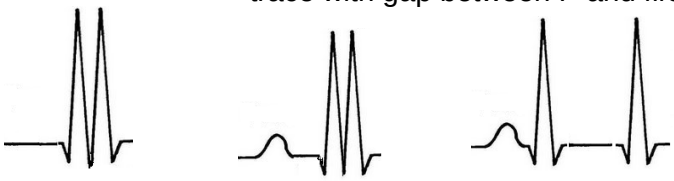
Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	columnar / ciliated **;** squamous / pavement **;**	2	**Mark the first two answers.** **IGNORE** 'cilia cells'
	(a)	(ii)	1. wall is <u>one</u> <u>cell</u> thick for short(er) **diffusion,** distance / pathway **;** **2. squamous,** cells / epithelium , provide short diffusion distance / pathway **;** 3. **elastic** so, **recoil /** expel air **/** helps **ventilation ;** 4. create / maintain, **concentration gradient /** described **;** **5.** large number (of alveoli) provide large(r) **surface area ;** **6.** small size (of alveoli) provide large(r) **surface area to volume ratio ;** **7.** (cells secrete) surfactant to maintain surface area **;** **max 4**		Mp 1 & 2 the phrase 'for short(er) diffusion distance' only needs to be stated once to gain both marks **IGNORE** ref to rate of diffusion **ACCEPT** 'alveolus / epithelium one cell thick' **DO NOT CREDIT** 'membrane / cell wall, one cell thick' **ACCEPT** pavement / thin / flat for squamous **IGNORE** thin wall **ACCEPT** gas for air **IGNORE** CO_2 / O_2 **IGNORE** diffusion gradient 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 **CREDIT** SA:Vol **ACCEPT** surfactant to prevent collapse

Question			Expected Answers	Marks	Additional Guidance
			QWC ; **max 1**	5 max	Any **two** technical terms from the list below used appropriately and spelled correctly : **concentration gradient** **squamous** **surface area to volume ratio** **ventilation** **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')
	(b)	**(i)**	spirometer **;**	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
			Total	**11**	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		phospholipid bilayer containing proteins **;** head / hydrophilic region, facing outwards **OR** tail / hydrophobic region, facing inwards **;** ref to intrinsic **and** extrinsic (glyco)proteins / described **;** *idea of*: glycoproteins ***/*** glycolipids, sticking out (of bilayer / membrane)**;** cholesterol, inside bilayer / between phospholipids **;**	3 max	**Marks can be awarded for an annotated diagram** **IGNORE** ref to 'fluid mosaic model' **ACCEPT** glycoprotein / channel protein / carrier protein / etc. for protein **DO NOT CREDIT** ref to hyrophobic heads or hydrophillic tails **ACCEPT** transmembrane for intrinsic **and** on surface for extrinsic **IGNORE** ref to functions such as 'carrier / channel' etc. **IGNORE** glycoproteins / glycolipids are, extrinsic / on the outside / on surface **CREDIT** between fatty acid tails
	(b)	(i)	<u>active</u> transport / uptake **;** (transport / carrier) protein **;**	2	**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** **ACCEPT** intrinsic protein / transmembrane protein **DO NOT CREDIT** channel protein / extrinsic protein
	(b)	(ii)	not permeable to, ammonia / NH_3 / ammonium / NH_4^+ **;**	1	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'

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

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

Question			Expected Answers	Marks	Additional Guidance
	(b)	(i)	P wave combined with larger peak before QRS complex **;**  	1	**Note:** - **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** **IGNORE** relative size and width of two QRS peaks **IGNORE** anything drawn after second QRS **IGNORE** small gap / 'bump' between two QRS peaks **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  **DO NOT CREDIT** two QRS with no sign of a P peak trace with gap between P and first QRS 

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

Question			Expected Answers	Marks	Additional Guidance
	(c)	(ii)	**EITHER** *Difference:* (fetal haemoglobin) higher affinity for oxygen / described / **ORA ;** *Reason:* (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**;** **OR** *Difference:* (fetal haemoglobin) contains gamma sub-units **;** *Reason:* creates high(er) affinity for oxygen **;**	2	**ACCEPT** able to become more saturated than adult haemoglobin at low pO_2 **IGNORE** gets more saturated at low pO_2 (ie no comparison to adult haemoglobin) **IGNORE** ref to saturation curve **CREDIT** 'associate with / combine with / loads' for bind **IGNORE** pick up / take up / gains / absorbs / attracts / attaches / saturates **DO NOT CREDIT** oxygen dissociates or haemoglobin dissociates
			Total	**11**	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		transport / synthesis / metabolism, of, fats / lipids / steroid (hormones) / carbohydrates **;** contain (hydrolysing) enzymes **OR** break down / digest, (named) organelles / cells / (named) pathogens **;** protein synthesis **;**	3	**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** **CREDIT** 'processes' 'packages' **ACCEPT** 'processes toxins' **DO NOT CREDIT** 'are, hydrolysing / digestive enzymes' 'produce enzymes' **IGNORE** ref to 'harmful substances' 'waste materials' 'phagocytosis' 'secretes enzymes' **CREDIT** ref to translation
	(b)		✓ **;** ✓ **;** ✓ **;**	3	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'
			Total	**6**	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

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OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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