

GCE

Biology

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

Advanced Subsidiary GCE

Mark Scheme for June 2017

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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 available in RM Assessor

<i>Annotation</i>	<i>Description</i>
	Point already given (i.e. Given max)
	Underline (for ambiguous / contradictory wording)
	Ignore
	LoR 1
	LoR 2
	LoR 3
	Correct response
	Omission
	Marking point partially met
	Benefit of doubt not given
	Irrelevant response
	Error carried forward
	Contradiction
	Incorrect response

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	allows (free) movement of, some / named, substances ; prevents movement of, other / named, substances ;	2	IGNORE use of word permeable in response Note 'allows movement of only certain substances' = 2 marks 'not all substances can pass through' = 2 marks
	(a)	(ii)	phospholipid (bilayer) ;	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 ALLOW fatty acid / hydrophobic tails
	(a)	(iii)	<u>facilitated diffusion</u> ; down concentration gradient / described ; <u>active transport</u> ; against / up , concentration gradient ; using, ATP / metabolic energy ; using , transport / channel / carrier , <u>protein</u> ;	3 max	DO NOT CREDIT if facilitated diffusion linked to use of ATP DO NOT CREDIT use of channel protein for active transport IGNORE endo / exocytosis

Question		Expected Answers	Marks	Additional Guidance
	(b) (i)	movement of water (molecules) through a (partially permeable) membrane ; down water potential gradient / described ;	2	IGNORE semi permeable ALLOW from high(er) to low(er) water potential IGNORE water concentration gradient
	(b) (ii)	salt dissolves (in water) ; exterior (solution) has <u>lower</u> water potential (than inside cell) / ORA ; water moves out of plant <u>cells</u> / <u>cells</u> dehydrated ; cells, lose turgidity / become flaccid / become plasmolysed OR plant wilts ; <i>idea of other consequence of lack of water ;</i>	3 max	ALLOW if implied by water moving out of cells down a water potential gradient e.g. water not available as reaction medium / no photosynthesis / no respiration tearing of membrane in extreme plasmolysis inability to transport in xylem / phloem DO NOT CREDIT cell dies (as death of weed stated in Q)
Total			11	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	(SA) increases ;	1	
	(a)	(ii)	none / no effect / stays the same ;	1	
	(b)		<p>surface area of needle leaf is, smaller / less than (round leaf) ORA ;</p> <p>use of figures <i>to illustrate</i> ;</p>	2	<p>IGNORE 'decreases'</p> <p>e.g. $\frac{1}{26}$ the size or $\frac{1}{25.9}$ the size</p> <p>or 157 compared to 4080(mm²)</p> <p>or needle is 3923(mm²) less</p> <p>Note (needle leaf is) 26 times smaller = 2 marks nearly round leaf is 26 times larger = 2 marks</p>

Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	transpiration is the, loss of water <u>vapour</u> / <u>evaporation</u> of water ;	1	IGNORE ref to aerial parts of plant rather than leaf
	(c)	(ii)	<p><i>error</i> error identified ;</p> <p style="text-align: right;">Max 1</p> <p><i>explanation</i> surface area to volume ratio of a needle shaped leaf is larger ; SA:Vol of needle = 4 compared to 2 for nearly round leaf ;</p> <p>OR</p>	3	<p>e.g. information incorrectly states 'needle shape / small, adaptation reduces the SA : Vol ratio of the leaf'</p> <p>IGNORE increases by 2 Note SA/Vol of needle is twice as large = 2 marks</p>

		<p>smaller leaf does not alter SA:Vol ratio ; both nearly round leaves have SA/Vol ratio of 2 ;</p> <p>OR it is the surface area of the needle shaped leaf that is smaller ; 157mm² compared to 4080mm² ;</p> <p style="text-align: right;">Max 2</p>		
	(c)	(iii)	<p><i>thick waxy cuticle</i> reduces, loss of water vapour / evaporation, through, epidermis / surface ;</p> <p><i>adaptation</i> hairs ;</p> <p><i>fewer air spaces</i> reduced surface area for evaporation ;</p>	<p>ALLOW water proofs epidermis</p> <p style="text-align: center;">3</p>
			Total	11

Question		Expected Answers	Marks	Additional Guidance
3	(a)	<p>A <u>right atrium</u> ;</p> <p>B <u>aorta</u> ;</p> <p>C <u>pulmonary artery</u> ;</p> <p>D <u>pulmonary vein</u> ;</p>	4	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer, then = 0 marks</p>
	(b)	<p>double circulatory system ;</p> <p>one circulation to lungs / pulmonary circuit ;</p> <p>one circulation to body / systemic circuit ;</p> <p>AVP ;</p>	3 max	<p>DO NOT CREDIT if named vessel incorrect</p> <p>e.g. allows different pressure in each system</p> <p>separates oxygenated from deoxygenated blood</p>
	(c)	<p>wall / (cardiac) muscle, thicker ;</p> <p>(left side) pumps blood ,</p> <p>to body / greater distance ;</p> <p>more resistance ;</p> <p>higher, pressure / force ;</p>	3 max	<p>Assume response refers to left ventricle</p> <p>ALLOW ORA throughout</p> <p>ACCEPT more / bigger muscle</p> <p>IGNORE larger</p> <p>DO NOT CREDIT smooth / skeletal muscle</p> <p>ALLOW to all respiring tissues</p> <p>IGNORE increased pressure</p> <p>DO NOT CREDIT under / withstand, higher pressure</p>
		Total	10	

Question		Expected Answers	Mark	Scheme	Additional Guidance	June 2017
4	(a)	<i>resolution</i> 200nm / 0.2µm ; <i>magnification</i> 1500X ;		2	ALLOW 50 - 200nm ALLOW 1000 – 2000 x DO NOT CREDIT if units given for magnification	
	(b) (i)	37 000 (X) ; ;		2	Correct answer = 2 marks Max 1 if any units stated ALLOW 36 – 38 000 ALLOW 3.7 X 10 ⁴ if answer incorrect ALLOW 1 mark for working: 74 000 µm / 2	
	(b) (ii)	detail of, cell components / organelles, cannot be seen by light microscope ; <u>resolution</u> of light microscope not great enough (to see this level of detail) ;		2	ALLOW a named cell structure / organelle / ultrastructure IGNORE bacteria cannot be seen by light microscope IGNORE magnification too low ALLOW max resolution is 200nm	
	(c)	<i>cell wall</i> peptidoglycan / not cellulose; <i>ribosomes</i> smaller / 70S / 18nm ;		2	Assume answer referring to bacteria unless otherwise stated. ALLOW ora / suitable alternative for plant cells ALLOW mucopeptides / glycopeptides / mureins ALLOW ref to ribosomes in plant cells being attached to ER	
	(d)	<i>idea of extensions</i> of plasma membrane (pili) enable, binding / attachment ; glycoproteins have, specific / complementary, <u>shape</u> ; (glycoproteins) bind to, molecules / receptors, on (cells of human) gut lining;		2 max	IGNORE ref to sticking (as given in Q) ALLOW antigens / surface molecules / proteins / receptor ALLOW 'fit into' as 'bind'	
			Total	10		

Question			Expected Answers	Marks	Additional Guidance																
5	(a)	(i)	(meri)stem ;	1	ALLOW pluripotent / omnipotent / totipotent / multipotent																
	(a)	(ii)	bone marrow / umbilical cord blood / embryonic tissue ;	1	ALLOW suitable tissue as a source																
	(b)	(i)	<table border="0"> <tr> <td>Feature</td> <td>Neutrophil</td> <td>Erythrocyte</td> <td></td> </tr> <tr> <td>Nucleus</td> <td>present</td> <td>absent</td> <td>;</td> </tr> <tr> <td>Lysosomes</td> <td>present</td> <td>absent</td> <td>;</td> </tr> <tr> <td>Mitochondria</td> <td>present</td> <td>absent</td> <td>;</td> </tr> </table>	Feature	Neutrophil	Erythrocyte		Nucleus	present	absent	;	Lysosomes	present	absent	;	Mitochondria	present	absent	;	3	Award 1 mark for each correct row DO NOT CREDIT ✓ or X
Feature	Neutrophil	Erythrocyte																			
Nucleus	present	absent	;																		
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Mitochondria	present	absent	;																		

Question		Expected Answers	Marks	Additional Guidance
(b)	(ii)	<p>small so have large surface area to volume ratio ;</p> <p>biconcave disc to give large SA:Vol ;</p> <p>large SA: Vol so have rapid exchange ;</p> <p>(contains) haemoglobin to, bind / associate with, oxygen ;</p> <p>no, nucleus / organelles, to allow more space (for haemoglobin) ;</p> <p><i>idea of flexible</i> / small to, squeeze through capillaries ;</p> <p>carbonic anhydrase present (for HCO_3^- formation) ;</p> <p style="text-align: right;">max 3</p>		<p>Feature must be clearly linked to benefit ALLOW SA:Vol, SA/Vol</p> <p>IGNORE carry, pick up, high affinity</p> <p>DO NOT CREDIT more space for oxygen</p> <p>ALLOW $7\mu\text{m}$ / same size as capillary lumen</p>
		QWC ;	1	<p>Place a green blob next to each word and a tick next to the pencil.</p> <p>Award if any two terms spelt correctly and used in correct context from:</p> <p>surface area to volume ratio haemoglobin biconcave carbonic anhydrase</p>
			4 max	
Total			9	

Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	bronchiole ;	1	ALLOW bronchus / bronchi
	(a)	(ii)	<p>R <u>smooth</u> muscle ;</p> <p>S ciliated / columnar, epithelium ;</p> <p>T cartilage ;</p>	3	<p>Mark the first answer on each prompt line. 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 elastic tissue</p> <p>DO NOT CREDIT squamous / ref to cells</p>

Question	Expected Answers	Marks	Additional Guidance
(b)	<p>R (<i>smooth muscle</i>) (smooth muscle in airway wall) contracts ; to , reduce size of lumen / constrict airway / limit air flow ; reduces / stops , harmful substances / allergens, entering lungs ;</p> <p>(smooth muscle in airway wall) relaxes ; to allow , dilation / larger lumen / easier air flow ; max 3</p> <p>S (<i>ciliated epithelium</i>) goblet cells , secrete / release , mucus ; which traps , pathogens / bacteria / dust ; cilia / ciliated cells , move the mucus up towards , mouth / throat / digestive system ; keeps , lungs / airways , clear (of infection) ; max 3</p>		<p>No ECF</p> <p>IGNORE close</p> <p>IGNORE unwanted substances</p> <p>IGNORE ref to muscle actively causing dilation (eg makes it dilate)</p> <p>ALLOW particles / particulates</p>
	QWC ;	1	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: dilation constrict(ion) lumen goblet cell mucus pathogen bacteria ciliated / cilia
		max 5	
	Total	9	

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