OCR
Oxford Cambridge and RSA

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.

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

Annotations available in RM Assessor

Annotation	*Description*
GM	Point already given (i.e. Given max)
	Underline (for ambiguous / contradictory wording)
I	Ignore
L1	LoR 1
L2	LoR 2
L3	LoR 3
	Correct response
^	Omission
	Marking point partially met
NBOD	Benefit of doubt not given
	Irrelevant response
ECF	Error carried forward
CON	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)	facilitated diffusion **;** down concentration gradient / described **;** active transport **;** against / up **,** concentration gradient **;** using, ATP / metabolic energy **;** using **,** transport / channel / carrier **,** protein **;**	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 lower water potential (than inside cell) / **ORA ;** water moves out of plant cells / cells dehydrated **;** cells, lose turgidity / become flaccid / become plasmolysed OR plant wilts **;** *idea of* other consequence of lack of water **;**	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)		surface area of needle leaf is, smaller / less than (round leaf) **ORA ;** use of figures *t*o illustrate **;**	2	**IGNORE** 'decreases' e.g. $\frac{1}{26}$ the size or $\frac{1}{25.9}$ the size **or** 157 compared to 4080(mm^2) **or** needle is 3923(mm^2) less **Note** (needle leaf is) 26 times smaller = 2 marks nearly round leaf is 26 times larger = 2 marks

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)	*error* error identified **;** **Max 1** *explanation* surface area to volume ratio of a needle shaped leaf is larger **;** SA:Vol of needle = 4 compared to 2 for nearly round leaf **;** **OR**	3	e.g. information incorrectly states 'needle shape / small, adaptation reduces the SA : Vol ratio of the leaf' **IGNORE** increases by 2 **Note** SA/Vol of needle is twice as large = 2 marks

			smaller leaf does not alter SA:Vol ratio **;** both nearly round leaves have SA/Vol ratio of 2 **;** **OR** it is the surface area of the needle shaped leaf that is smaller **;** 157mm^2 compared to 4080mm^2 **;** **Max 2**		
	(c)	**(iii)**	*thick waxy cuticle* reduces, loss of water vapour / evaporation, through, epidermis / surface **;** *adaptation* hairs **;** *fewer air spaces* reduced surface area for evaporation **;**	**3**	**ALLOW** water proofs epidermis
			Total	**11**	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		**A** right atrium **;** **B** aorta **;** **C** pulmonary artery **;** **D** pulmonary vein **;**	**4**	**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**
	(b)		double circulatory system **;** one circulation to lungs / pulmonary circuit **;** one circulation to body / systemic circuit **;** AVP **;**	**3 max**	**DO NOT CREDIT** if named vessel incorrect e.g. allows different pressure in each system separates oxygenated from deoxygenated blood
	(c)		wall / (cardiac) muscle, thicker **;** (left side) pumps blood **,** to body / greater distance **;** more resistance **;** higher, pressure / force **;**	**3 max**	**Assume response refers to left ventricle** **ALLOW ORA throughout** **ACCEPT** more / bigger muscle **IGNORE** larger **DO NOT CREDIT** smooth / skeletal muscle **ALLOW** to all respiring tissues **IGNORE** increased pressure **DO NOT CREDIT** under / withstand, higher pressure
			Total	**10**	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		*resolution* 200nm / 0.2µm **;** *magnification* 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 **;** resolution 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)		*cell wall* peptidoglycan / not cellulose**;** *ribosomes* 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)		*idea of* extensions of plasma membrane (pili) enable, binding / attachment **;** glycoproteins have, specific / complementary, shape **;** (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)	**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

Question			Expected Answers	Marks	Additional Guidance
	(b)	(ii)	small so have large **surface area to volume ratio ;** **biconcave** disc to give large SA:Vol **;** large SA: Vol so have rapid exchange **;** (contains) **haemoglobin** to, bind / associate with, oxygen **;** no, nucleus / organelles, to allow more space (for haemoglobin) **;** *idea of* flexible / small to, squeeze through capillaries **;** **carbonic anhydrase** present (for HCO_3^- formation) **;** **max 3**		**Feature must be clearly linked to benefit** **ALLOW** SA:Vol, SA/Vol **IGNORE** carry**,** pick up, high affinity **DO NOT CREDIT** more space for oxygen **ALLOW** 7µm / same size as capillary lumen
			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: surface area to volume ratio haemoglobin biconcave carbonic anhydrase
				4 max	
			Total	**9**	

Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	bronchiole **;**	1	**ALLOW** bronchus / bronchi
	(a)	(ii)			**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**
			R <u>smooth</u> muscle **;**		**DO NOT CREDIT** elastic tissue
			S ciliated / columnar, epithelium **;**		**DO NOT CREDIT** squamous / ref to cells
			T cartilage **;**	3	

Question	Expected Answers	Marks	Additional Guidance
(b)	***R*** *(smooth muscle)* (smooth muscle in airway wall) contracts **;** to **,** reduce size of **lumen** / **constrict** airway / limit air flow **;** reduces / stops **,** harmful substances / allergens, entering lungs **;** (smooth muscle in airway wall) relaxes **;** to allow **, dilation** / larger lumen / easier air flow **;** **max 3** ***S*** *(ciliated epithelium)* **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**		**No ECF** **IGNORE** close **IGNORE** unwanted substances **IGNORE** ref to muscle actively causing dilation (eg makes it dilate) **ALLOW** particles / particulates
	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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