OCR
Oxford Cambridge and RSA

GCE

Biology

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

Advanced Subsidiary GCE

Mark Scheme for June 2016

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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

Annotation	***Description***
GM	Point already given (i.e. Given max)
~~	Underline (for ambiguous / contradictory wording)
I	Ignore
✓	Correct response
^	Omission
●	Marking point partially met
NBOD	Benefit of doubt not given
≈	Irrelevant response
ECF	Error carried forward
CON	Contradiction
✗	Incorrect response

Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	Separates marking points
reject	Answers which are not worthy of credit
not	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
( )	Words which are not essential to gain credit
__	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

Question			Expected Answers	Marks	Additional Guidance
1	(a)		(cell) very small **OR** large surface area to volume ratio **;** short diffusion pathway **;** *idea that* diffusion sufficient / fast enough, to supply (all) needs **;**	max 2	**IGNORE** low, activity / metabolic rate **IGNORE** not very big / small (unless qualified) **ACCEPT** microscopic **ACCEPT** larger SA:Vol (ratio)
	(b)		nucleus **;** (contractile / food) vacuole **;**	max 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**
	(c)	(i)	phospholipids / phospholipid bilayer **;**	1	**Mark the first answer.** **IGNORE** cholesterol **DO NOT CREDIT** phosphate / heads **ACCEPT** phospholipid tails / lipid tails / fatty acids

Question			Expected Answers	Marks	Additional Guidance
		(ii)	control what, enters / leaves, the organelles ; (contains receptors to) detect changes in environment ; compartmentalisation ; site for, enzymes / electron carriers / components of metabolic pathways ; create concentration gradients ; form pseudopodia ;	max 2	**Mark the first two answers.** If two correct responses are given followed by one or two incorrect responses or which contradict the correct answers then = **1 or 0 marks** **IGNORE** ref to control of materials entering / leaving <u>cell</u> / ref. to barrier with outside **ACCEPT** cell, communication / signalling / recognition **ACCEPT** separate, organelles/ DNA / food / enzymes, (from cytoplasm) separate organelles from each other formation of , vesicles / vacuoles hold water separate metabolic pathways **IGNORE** ref to increases surface area
	(d)	(i)	<u>exocytosis</u> ;	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** **DO NOT CREDIT pinocytosis / pino(exocytosis)**

Question			Expected Answers	Marks	Additional Guidance
		(ii)	burst / lysis / plasma membrane would rupture **;**	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** **ACCEPT** haemolysis **DO NOT CREDIT** plasmolysis
	(e)		WP of -100 solution higher than -400 / ORA **;** (at -100kPa) water potential gradient steeper **/** described / ORA **;** (at -100kPa) water enters Amoeba more quickly / ORA **;**	max 2	**IGNORE** refs to hyper / hypo tonic solutions **ACCEPT -**100 less negative than -400 Note: response must contain clear ref to both -100 solution and -400 solution **ACCEPT** more water enters Note: ref to osmosis being more rapid **only** valid if direction of water movement is clear
			Total	**10**	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		(ability to continue) dividing **;**	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**
	(b)		move / waft / sweep, mucus **;** produce / release / secrete , mucus **;** constrict the (named) airways **;** provide, thin barrier / short diffusion distance **;**	4	**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** **DO NOT CREDIT** excrete **CREDIT** narrows lumen / reduces diameter of airway **IGNORE** controls, diameter / air flow **IGNORE** smooth lining / *reduces* diffusion distance **IGNORE** thin, surface / cells, for diffusion
	(c)		transport / movement / mass flow, of, assimilates / sucrose / amino acids **;** from source to sink / description **;**	2	**IGNORE** ref to (organic) solutes / food / glucose / sugars e.g. from cells / tissues / site where produced to cells / tissues / site where used **ACCEPT** named source AND sink
			Total	**7**	

Question			Expected Answers	Marks	Additional Guidance
3	(a)		Z ;	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**
	(b)		Fig. 3.1(a) (no mark) shows surface view ; 3D / three dimensional ; better <u>resolution</u> (than b) ;	max 2	Please place a green blob on paper Do not allow mp 2 if fig 3.1 b selected Do not allow mp 3 if fig 3.1 b selected Must be comparative comment
	(c)		cell walls ; plasmodesma(ta) ; endodermis / endodermal ; Casparian strip ;	4	**DO NOT CREDIT** Caspian / Caspiran
	(d)	(i)	C ;	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**
		(ii)	small(er) <u>surface area</u> means less, evaporation / transpiration ;	1	**Mark independent of (d)(i)** **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** **IGNORE** less water loss / fewer stomata **DO NOT CREDIT** small surface area to volume ratio **DO NOT CREDIT** no, transpiration / evaporation

Question			Expected Answers	Marks	Additional Guidance
		(iii)	thick (waxy) cuticle ; few stomata ; stomata, sunken / in pits ; hairs / hairy ; leaf, curled / rolled ; dense spongy mesophyll ; closure of stomata, during day / when water availability low ;	max 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**
	(e)		water vapour around the, stomata / leaf surface, is blown away; reduces water (vapour) potential around, stomata ; *idea of*: increases / maintains, water (vapour) potential gradient (between air space in leaf and outside) ;	max 2	**IGNORE** moisture (for all mark points) **ACCEPT** boundary layer reduced **ACCEPT** evaporated water as water vapour **ACCEPT** relative humidity for water potential **IGNORE** diffusion gradient / concentration gradient
			Total	**12**	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		create / provide / increase contrast **;** make, cells / (named) component(s), visible OR cells / (named) components, can be, identified / distinguished / differentiated **;**	2	**IGNORE** clearer **ACCEPT** (named) organelle(s) stand out from surroundings **ACCEPT** regions / parts / AW, of cell
	(b)	(i)	anaphase **;**	**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**

Question			Expected Answers	Marks	Additional Guidance
		(ii)	1. **chromosomes** coil / **supercoil** / **condense** ; **2. nuclear envelope** disintegrates ; **3. nucleolus,** no longer visible / disappears ; **4. centrioles** move to opposite, ends of cell / **poles** ; 5. chromosomes attached to **spindle** fibres at **centromere** ; **6.** chromosomes align at **equator** ; 7. chromosomes move towards opposite, poles / ends of cell ; 8. spindle fibres change length / shorten ; **max 4** QWC ; **max 1**	max 5	**ACCEPT** chromatid for chromosome throughout Note: There is no mark for naming phases, but if phase is mentioned and description is incorrect for named phase then **DO NOT CREDIT** Accept mp 1-5 in prophase, mp 6 metaphase, mp 7 anaphase mp 8 in any phase **IGNORE** ref to events in telophase and cytokinesis, as they occur *after* anaphase **ACCEPT** chromatin **ACCEPT** nuclear membrane **IGNORE** dissolves **DO NOT CREDIT** pairs of chromosomes line up **ACCEPT** pairs of chromatids line up **IGNORE** spindle fibres contract 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: **chromosomes / chromatids / chromatin** **supercoil** **nucleolus** **condense** **centromere** **nuclear envelope** (but not membrane) **centriole** **pole** **spindle** **equator**

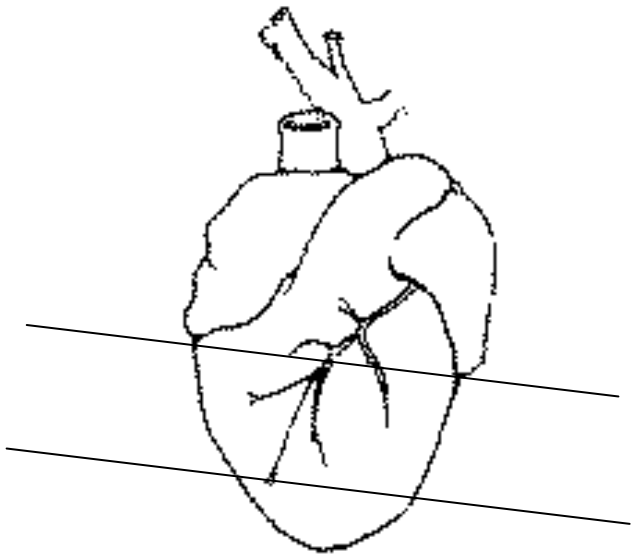
Question	Expected Answers	Marks	Additional Guidance
(c)			**For mp 1 & 2 where candidates link events to S & G phases then description must be correct for phase.** **S phase is DNA synthesis only** **G phases contain protein synthesis, increasing numbers of organelles, growth, increased respiration and checking of DNA.**
	DNA / genetic material, replicated / synthesised / checked ;		**IGNORE** chromosomes replicate / DNA copied / DNA doubles
	cell growth / increased respiration / protein synthesis / increase in number of organelles ;		**ACCEPT** more ATP
	cytokinesis / cell surface membrane constricts / cytoplasm splits in two / cell plate forms (plants) ;		
	ref to G and S phases ;		**ACCEPT** Gap or 'growth' for G and Synthesis for S throughout **ACCEPT** in context of diagram
		max 3	
	Total	**11**	

Question			Expected Answers	Marks	Additional Guidance
5	(a)		must remain small OR cannot grow tall / large / big ; no support from vascular tissues / vascular bundles / xylem ; use only diffusion / no mass flow / no rapid transport ; diffusion too slow (to enable substances to move large distances) ; idea of: short diffusion pathway / large surface area to volume ratio ;	Max 2	

Question	Expected Answers	Marks	Additional Guidance
(b)	*1. idea of* water lost by **evaporation / transpiration / evapotranspiration ;**		
	2. (water moves by) **symplast** and **apoplast** pathways **;**		**DO NOT CREDIT** mp 2 – 7 in context of water uptake **DO NOT CREDIT mp 3-7 in context of movement in xylem either stated or implied**
	3. through / along cell walls by, **capillary action / adhesion** (apoplast pathway) **;**		AWARD **only** where it is clear that the movement is in context of apoplast.
	1. (water loss) reduces the **water potential** of (leaf) cells **;**		**ACCEPT** ψ
	2. water moves from higher water potential to lower water potential / <u>down</u> **water potential gradient** (symplast pathway) **;**		
	3. by **<u>osmosis</u>** (symplast pathway) **;**		**IGNORE** osmosis if used in context of apoplast pathway
	4. through **plasmodesmata** (symplast pathway) **;** **max 3** **QWC ;** **max 1**	max 4	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: **apoplast** **osmosis** **symplast** **adhesion** **capillary action** **plasmodesmata** **evaporation** (allow correct derivatives) **transpiration** **evapotranspiration** **water potential** **water potential gradient**

Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	group of cells ; working together / performing a function ;	 2	**ACCEPT** cells derived from same stem cell source
		(ii)	palisade (mesophyll) ; spongy mesophyll ; guard cells ; (upper / lower) epidermal cells ; AVP ;	 2 max	**Mark the first two answers.** If two correct responses are given followed by one or two incorrect responses or which contradict the correct answers then = **1 or 0 marks** e.g. parenchyma, collenchyma, sclerenchyma
			Total	**10**	

Question			Expected Answers	Marks	Additional Guidance
6	(a)		14 000 / 120 = 117 µm **;;**	2	length of line A-B = 14mm / 14000 µm Correct answer = 2 marks. Allow one mark if correct working shown including units for cm & mm e.g. 1.4 cm / 120 14 mm / 120 14000 / 120 If answer = 125 µm allow one mark for correct working but incorrect measurement (15mm instead of 14) Allow one mark if not rounded to nearest micrometre
	(b)		**F ;** **A ;** **B** or **D ;** **E ;**	4	

Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	a line drawn across the ventricles ;	1	**ACCEPT** any line between those shown below 
		(ii)	K = right ventricle ; L = (interventricular) septum ; M = (left) ventricle wall / cardiac muscle / myocardium ;	3	 **ACCEPT** septem **IGNORE** ventricle
			Total	**10**	

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