OCR
RECOGNISING ACHIEVEMENT

GCE

Biology

Advanced Subsidiary GCE

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

Mark Scheme for January 2011

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Question			Expected Answers	Marks	Additional Guidance
1	(a)		mitosis / mitotic division **;**	**1**	**DO NOT CREDIT** meitosis, miosis **ACCEPT** mytosis
	(b)		**N ;** **L ;** **K ;** **J ;**	**4**	**Mark the first answer for each stage**. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**.
	(c)		**1** checking, genetic material / DNA / chromatin / chromosome(s) / genes, (for errors) **;** **2** protein synthesis **;** **3** synthesis / replication / increase in number of, organelles / named organelle **;** **4** ATP production / respiration **;** **5** <u>cell</u> growth / increase in <u>cell</u>, volume / size **;**	**2 max**	**Mark the first two suggestions only.** **IGNORE** DNA , replication / synthesis **ACCEPT** checking for mutations **DO NOT CREDIT** check for *cell* mutations **ACCEPT** named step e.g. transcription / translation / described **CREDIT** one named organelle only **ACCEPT** centriole as organelle **IGNORE** organelle growth **IGNORE** release energy **DO NOT CREDIT** produce / create, energy (in form of ATP) **IGNORE** cytoplasm replicates

Question			Expected Answers	Marks	Additional Guidance
	(d)				**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.**
			in plant (cell), plate / wall, forms (between new cells) **;** *idea of :* cytokinesis starts from middle of cell **;** (only) occurs in meristem **;** no centrioles **;** AVP **;**	**2 max**	Assume response refers to plants unless stated otherwise. Accept reverse argument for animals. **CREDIT** in animal no cell plate **IGNORE** plants have cell walls unqualified **ACCEPT** cytokinesis starts at outer edge in animals **ACCEPT** cambium / specialised tissues / cells **IGNORE** ref (root) cap, root tip / shoot tip **CREDIT** in animals most, cells / tissues, can divide **ACCEPT** centrioles not used to pull chromatids apart **DO NOT CREDIT** no spindle fibres in plants e.g. nuclear envelope does not reform in most plant cells in telophase I (it does form in most animal cells)
			Total	**9**	

Question			Expected Answers	Marks	Additional Guidance
2	(a)		A = bronchiole **;** B = alveolus / alveoli **;**	**2**	**Mark the first answer for each letter.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**. **DO NOT CREDIT** bronchus **ACCEPT** phonetic spelling of alveolus and bronchiole e.g. aveoli
	(b)		**1** large, surface area / SA :VOL **;** **2** (alveolar) wall / epithelium, one cell thick **;** **3** (made of) squamous, cells / epithelium **;** **4** ref to surfactant **;** *idea of:* **5** (very) close to, capillaries / blood supply **OR** rich blood supply / many capillaries **;**	**2 max**	**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **ACCEPT** large SA / VOL, (alveoli) are small **and** in large number **DO NOT CREDIT** large amounts of tiny alveoli **ACCEPT** thin wall / thin barrier **DO NOT CREDIT** ref to cell wall / lining **IGNORE** alveolus one cell thick **ACCEPT** correct description of squamous cells (e.g. thin flat cell layer) **ACCEPT** pavement epithelium **IGNORE** reference to moist **DO NOT CREDIT** endothelium **IGNORE** ref to elastic fibres

Question			Expected Answers	Marks	Additional Guidance
	(c)		**1** (histamine), binds / attaches, to, receptor / glycoprotein **;** *idea of :* **2** in / on, plasma / cell surface, membrane (of muscle cell) **;** **3** <u>complementary</u> (shape) **;** **4** triggers response / causes effect, inside cells **;**	**2 max**	**binds to complementary receptor = 2 marks** **ACCEPT** glycolipids **IGNORE** binding site, ref antigens **ACCEPT** in / on, cell surface / cell membrane (of muscle cells) **ACCEPT** membrane bound receptors (on muscle cells) **CREDIT** correct examples of effects / details inside cells e.g. ref to opening sodium channes in cell surface membrane ref to second messenger ref to cyclic AMP ref to activation of enzymes / kinases ref to phosphorylation
	(d)		*idea of :* **1** more tissue fluid formed / increase in volume of tissue fluid **;** **2** increase pressure in tissue **;** **3** swelling / inflammation / oedema**;** **4** (more) white blood cells pass into tissues **;** **5** larger molecules / (named) proteins , pass into tissue fluid **;**	**2 max**	**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **IGNORE** refs to the capillaries becoming more leaky **IGNORE** more water passes out **DO NOT CREDIT** *cells* swell **ACCEPT** (more) white blood cells leave the capillary **IGNORE** ref to more, glucose / nutrients / gases, leave blood capillary **IGNORE** ref to increased rate of diffusion
			Total	**8**	

Question			Expected Answers	Marks	Additional Guidance
3			surface area to volume ratio **;**		**ACCEPT** SA / VOL **or** SA:Vol
			<u>erythrocytes</u> **;**		**ACCEPT** minor spelling errors if phonetically correct e.g. erythocyte **DO NOT CREDIT** erthocytes, erephosite, erthrocyte **IGNORE** red blood cells
			affinity **;**		**ACCEPT** attraction
			oxyhaemoglobin **;**		**ACCEPT** HbO / HbO_8 **DO NOT CREDIT** HbO_2 etc
			carbon dioxide / CO_2 / hydrogen ions / H^+ **;**		**ACCEPT** carbonic acid **DO NOT CREDIT** CO^2 **DO NOT CREDIT** hydrogen, H, H_2
			Bohr / bohr (shift) **;**	**6**	**ACCEPT** phonetic spellings e.g. borr, bore, borh
			Total	**6**	

Question			Expected Answers	Marks	Additional Guidance
4	(a)		U ; R ; V ;	3	**Mark the first answer for each tissue.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**.
	(b)		no cross walls / cells joined end to end / continuous ; hollow / no contents / no organelles / no cytoplasm ; (walls / vessels) lignified ; (bordered) pits in walls ;	2 max	**IGNORE** ref to dead cells / tubes **DO NOT CREDIT** lined / covered with lignin **DO NOT CREDIT** (walls) made of lignin **ACCEPT** xylem has lignin
	(c)	(i)	evaporation / loss of water vapour ; from, aerial parts of plant / leaf / leaves ; via stomata ;	2 max	**movement of water vapour out of leaf = 2 marks** **DO NOT CREDIT** loss of water alone **CREDIT** loss through cuticle / epidermis

Question	Expected Answers	Marks	Additional Guidance
(c) (ii)	*In the leaf:* *idea of :* **1** water loss (from leaf) is replaced **;** **2** via, **apoplast** / **symplast** / **vacuolar**, pathways **;** **3** down **water potential** gradient / AW **;** **4** (lost water replaced) by water from the **xylem ;** *In the xylem:* **5** (loss of water) causes, low / negative, (**hydrostatic**) pressure (at top / in leaf) **OR** creates pressure gradient **;** *idea of :* **6** water moves, from higher pressure to lower pressure / down pressure **gradient ;** **7** under **tension** / pulled up / drawn up **;** **8** by **<u>mass flow</u> ;** **9 cohesion** / attraction, between water molecules **;** *idea of :* **10** column / stream / chain, of water (molecules) **;** **QWC ;**	**4 max** **1**	**DO NOT CREDIT** ref to water potential in context of xylem **IGNORE** ref to root pressure or capillarity **ACCEPT** Ψ / WP for water potential For mp 2 & 3 **DO NOT CREDIT** in context of root **CREDIT** pathways described in correct context Idea of : water leaving xylem to enter leaf cells (that have lost water) **IGNORE** 'water moves by the cohesion-tension theory' without further explanation **ACCEPT** along pressure gradient Idea of: pulling force and not just water movement created by transpiration **DO NOT CREDIT** mp 7 or 8 in context of adhesion / capillarity or water potentials **IGNORE** suction, transpiration pull unqualified **CREDIT** hydrogen bonding between water molecules **IGNORE** long unqualified <u>TWO</u> terms used appropriately and spelt correctly: **xylem , apoplast/symplast/vacuolar , hydrostatic , gradient , cohesion / cohesive , tension , mass flow , water potential**

Question			Expected Answers	Marks	Additional Guidance
		(iii)	*Ref to :* bubbles / air (present / being removed) **;** (blockage) in xylem **;** restore (continuous) column of water (in xylem) **;**	**2 max**	**air in the xylem = 2 marks**
			Total	**14**	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	nucleus / nuclear envelope / nuclear membrane / nucleolus **;** membrane bound organelles / named organelle **;** ribosomes larger **;** (large) cell size / 20µm wide **;**	**2 max**	**Mark the first <u>two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **ACCEPT** SER / RER / vesicle / cilia **DO NOT CREDIT** presence of ribosome / vacuole / flagellum / undulipodium
		(ii)	*Two marks for correct answer* 4500 **; ;**	**2**	**No tolerance in initial measurement = exactly 90mm** If answer is incorrect, allow one mark for correct working i.e. any measurement divided by 20 e.g. 8.9 / 20
		(iii)	**1** provides, strength / stability / support (cell) **;** **2** determines shape / changes shape / moves membrane (for endo / exocytosis) **;** **3** movement of, organelles / named organelle / RNA / protein / chromosomes / chromatids **;** **4** attachment to / hold, organelles / named organelle, in place**;** **5** make up, centrioles / spindle fibres **;**	**2 max**	**Mark the first <u>two</u> suggestions. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **IGNORE** structure **IGNORE** movement of (whole) cell e.g. vesicles, cilia, mitochondria, ribosome

Question			Expected Answers	Marks	Additional Guidance
	(b)	**(i)**	differentiation **;**	**1**	**Mark the first answer.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**. **DO NOT CREDIT** specialisation
		(ii)			**Max 2 marks for content if no reference is made at least once to large numbers of named organelles / receptors** **IGNORE** reasons or explanations **IGNORE** lobed nucleus **IGNORE** many enzymes
			1 (many) **lysosomes** / vesicles containing enzymes **;**		**IGNORE** lysomes **ACCEPT** lyosomes **DO NOT CREDIT** lysosomes are enzymes
			2 (many) microfilaments / microtubules **OR** ref to, extensive / well developed, cytoskeleton **;**		
			3 (many) **ribosome**s / (a lot of) **rough endoplasmic reticulum** / (a lot of) RER **;**		
			4 (many) **mitochondria ;**		
			5 (lots of) **Golgi ;**		
			6 (many) receptor (sites) on, **cell surface / plasma , membrane ;**		**IGNORE** ref glycoproteins / glycolipids unqualified
				3 max	
			QWC ;	**1**	TWO terms used appropriately and spelt correctly: **lysosome(s), ribosome(s), rough endoplasmic reticulum, mitochondria / mitochondrion, Golgi/golgi, microfilaments/microtubules / cytoskeleton, cell surface membrane / plasma membrane.**
			Total	**11**	

Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	osmosis **;**	1	**Mark the first answer.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**. **DO NOT CREDIT** diffusion
		(ii)	fit between (phospho)lipids / through (phospho)lipid (bi)layer **;** via, protein channels / protein pores / aquaporins **;**	2	**DO NOT CREDIT** fit through phospholipids (molecules) **DO NOT CREDIT** carrier proteins – if this is used do not award mp 2 **IGNORE** transport proteins
	(b)		cell wall **;** provides strength / withstands (internal) pressure / prevents cell membrane over expanding / exerts pressure potential **;** limits uptake of water **;**	2 max	**'has a strong cell wall' = 2 marks** **IGNORE** rigidity (of wall), cytoplasm pushes against cell wall **ACCEPT** stops uptake of water (when turgid)
	(c)	(i)	between –1451 and –1799 **;**	1	**Ensure figure is a negative number** **CREDIT** a range or single value within this range

Question			Expected Answers	Marks	Additional Guidance
		(ii)	*idea of:* **1** plot, percentage plasmolysed against water potential (of solution) / water potential on X axis and % plasmolysed on Y axis **;** *idea of:* **2** read down from 50% plasmolysed to water potential **;** **OR** *idea of:* **1** plot, % plasmolysed against sucrose concentration / sucrose concentration on X axis and % plasmolysed on Y axis **;** *idea of :* **2** read down from 50% plasmolysed to sucrose concentration **AND** look up equivalent water potential **;**	**2**	**IGNORE** ref to bars / bar graph **ACCEPT** axes wrong way round **ACCEPT** marking points shown correctly on annotated sketch line graph

Question	Expected Answers	Marks	Additional Guidance
(d)	*reliable* **R1** observe more pieces of onion (epidermis from each solution) **;** **R2** count more cells (in each piece of epidermis) **;** **R3** calculate a mean **;** **R4** identify / ignore anomalous results **;** **max 3** *accurate* *idea of:* **A1** use, more / intermediate, concentrations within existing range / smaller gap between concentrations / closer (concentration) values **;** **A2** narrower range around 50% plasmolysis / 0.4 - 0.7 mol dm^{-3} / -1120 to -2180 kPa **;** **A3** take photographs and mark cells as counting **;**	**4 max**	**DO NOT CREDIT** 'repeats' unless qualified **ALLOW** 'repeat the results / experiment' to indicate more pieces of epidermis **IGNORE** average **ACCEPT** outliers for anomalies **IGNORE** removes / avoids, anomalies **IGNORE** lack of units **ACCEPT** examples of values quoted in between original values e.g. 0.25, 0.35, etc. **ACCEPT** 0.2 **and** 0.9 **ACCEPT** examples of values if clearly showing application of correct narrower range e.g. 0.45, 0.55 , 0.65 For A2 **DO NOT CREDIT** quoted values extend beyond correct narrower range e.g. 0.35, 0.55, 0.75
	Total	**12**	

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