

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 meiosis, 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)		<p>1 checking, genetic material / DNA / chromatin / chromosome(s) / genes, (for errors) ;</p> <p>2 protein synthesis ;</p> <p>3 synthesis / replication / increase in number of, organelles / named organelle ;</p> <p>4 ATP production / respiration ;</p> <p>5 <u>cell</u> growth / increase in <u>cell</u>, volume / size ;</p>	2 max	<p>Mark the first two suggestions only. IGNORE DNA , replication / synthesis ACCEPT checking for mutations DO NOT CREDIT check for <i>cell</i> mutations</p> <p>ACCEPT named step e.g. transcription / translation / described</p> <p>CREDIT one named organelle only ACCEPT centriole as organelle IGNORE organelle growth</p> <p>IGNORE release energy DO NOT CREDIT produce / create, energy (in form of ATP)</p> <p>IGNORE cytoplasm replicates</p>

Question		Expected Answers	Marks	Additional Guidance
	(d)	<p><i>in plant</i></p> <p>(cell), plate / wall, forms (between new cells) ;</p> <p><i>idea of :</i></p> <p>cytokinesis starts from middle of cell ;</p> <p>(only) occurs in meristem ;</p> <p>no centrioles ;</p> <p>AVP ;</p>	2 max	<p>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.</p> <p>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</p> <p>ACCEPT cytokinesis starts at outer edge in animals</p> <p>ACCEPT cambium / specialised tissues / cells IGNORE ref (root) cap, root tip / shoot tip CREDIT in animals most, cells / tissues, can divide</p> <p>ACCEPT centrioles not used to pull chromatids apart DO NOT CREDIT no spindle fibres in plants</p> <p>e.g. nuclear envelope does not reform in most plant cells in telophase I (it does form in most animal cells)</p>
		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 ; <i>idea of:</i> 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)	<p>1 (histamine), binds / attaches, to, receptor / glycoprotein ;</p> <p><i>idea of :</i></p> <p>2 in / on, plasma / cell surface, membrane (of muscle cell) ;</p> <p>3 <u>complementary</u> (shape) ;</p> <p>4 triggers response / causes effect, inside cells ;</p>	2 max	<p>binds to complementary receptor = 2 marks</p> <p>ACCEPT glycolipids</p> <p>IGNORE binding site, ref antigens</p> <p>ACCEPT in / on, cell surface / cell membrane (of muscle cells)</p> <p>ACCEPT membrane bound receptors (on muscle cells)</p> <p>CREDIT correct examples of effects / details inside cells e.g. ref to opening sodium channels in cell surface membrane ref to second messenger ref to cyclic AMP ref to activation of enzymes / kinases ref to phosphorylation</p>
	(d)	<p><i>idea of :</i></p> <p>1 more tissue fluid formed / increase in volume of tissue fluid ;</p> <p>2 increase pressure in tissue ;</p> <p>3 swelling / inflammation / oedema;</p> <p>4 (more) white blood cells pass into tissues ;</p> <p>5 larger molecules / (named) proteins , pass into tissue fluid ;</p>	2 max	<p>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.</p> <p>IGNORE refs to the capillaries becoming more leaky</p> <p>IGNORE more water passes out</p> <p>DO NOT CREDIT cells swell</p> <p>ACCEPT (more) white blood cells leave the capillary</p> <p>IGNORE ref to more, glucose / nutrients / gases, leave blood capillary</p> <p>IGNORE ref to increased rate of diffusion</p>
		Total	8	

Question	Expected Answers	Marks	Additional Guidance
3	surface area to volume ratio ; <u>erythrocytes</u> ; affinity ; oxyhaemoglobin ; carbon dioxide / CO ₂ / hydrogen ions / H ⁺ ; Bohr / bohr (shift) ;	6	ACCEPT SA / VOL or SA:Vol ACCEPT minor spelling errors if phonetically correct e.g. erythrocyte DO NOT CREDIT erthocytes, erephosite, erthrocyte IGNORE red blood cells ACCEPT attraction ACCEPT HbO / HbO ₈ DO NOT CREDIT HbO ₂ etc ACCEPT carbonic acid DO NOT CREDIT CO ² DO NOT CREDIT hydrogen, H, H ₂ 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)	<p><i>In the leaf:</i> <i>idea of :</i> 1 water loss (from leaf) is replaced ;</p> <p>2 via, apoplast / symplast / vacuolar, pathways ;</p> <p>3 down water potential gradient / AW ;</p> <p>4 (lost water replaced) by water from the xylem ;</p> <p><i>In the xylem:</i> 5 (loss of water) causes, low / negative, (hydrostatic) pressure (at top / in leaf) OR creates pressure gradient ;</p> <p><i>idea of :</i> 6 water moves, from higher pressure to lower pressure / down pressure gradient ;</p> <p>7 under tension / pulled up / drawn up ;</p> <p>8 by mass flow ;</p> <p>9 cohesion / attraction, between water molecules ;</p> <p><i>idea of :</i> 10 column / stream / chain, of water (molecules) ;</p> <p>QWC ;</p>	<p>4 max</p> <p>1</p>	<p>DO NOT CREDIT ref to water potential in context of xylem IGNORE ref to root pressure or capillarity ACCEPT Ψ / WP for water potential</p> <p>For mp 2 & 3 DO NOT CREDIT in context of root CREDIT pathways described in correct context</p> <p>Idea of : water leaving xylem to enter leaf cells (that have lost water)</p> <p>IGNORE 'water moves by the cohesion-tension theory' without further explanation ACCEPT along pressure gradient</p> <p>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</p> <p>IGNORE long unqualified</p> <p><u>TWO</u> terms used appropriately and spelt correctly: xylem , apoplast/symplast/vacuolar , hydrostatic , gradient , cohesion / cohesive , tension , mass flow , water potential</p>

Question			Expected Answers	Marks	Additional Guidance
		(iii)	<i>Ref to :</i> 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)	<i>Two marks for correct answer</i> 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)	<p>1 (many) lysosomes / vesicles containing enzymes ;</p> <p>2 (many) microfilaments / microtubules OR ref to, extensive / well developed, cytoskeleton ;</p> <p>3 (many) ribosomes / (a lot of) rough endoplasmic reticulum / (a lot of) RER ;</p> <p>4 (many) mitochondria ;</p> <p>5 (lots of) Golgi ;</p> <p>6 (many) receptor (sites) on, cell surface / plasma , membrane ;</p> <p>QWC ;</p>	<p>3 max</p> <p>1</p>	<p>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</p> <p>IGNORE lysosomes ACCEPT lysosomes DO NOT CREDIT lysosomes are enzymes</p> <p>IGNORE ref glycoproteins / glycolipids unqualified</p> <p><u>TWO</u> 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.</p>
			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 <u>channels</u> / protein <u>pores</u> / 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)	<p><i>idea of:</i> 1 plot, percentage plasmolysed against water potential (of solution) / water potential on X axis and % plasmolysed on Y axis ;</p> <p><i>idea of:</i> 2 read down from 50% plasmolysed to water potential ;</p> <p>OR</p> <p><i>idea of:</i> 1 plot, % plasmolysed against sucrose concentration / sucrose concentration on X axis and % plasmolysed on Y axis ;</p> <p><i>idea of :</i> 2 read down from 50% plasmolysed to sucrose concentration AND look up equivalent water potential ;</p>	2	<p>IGNORE ref to bars / bar graph ACCEPT axes wrong way round ACCEPT marking points shown correctly on annotated sketch line graph</p>

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

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