



Biology

Advanced Subsidiary GCE

Unit F211: Cells, Exchange and Transport

Mark Scheme for June 2012

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Annotations

Annotations available in SCORIS.

Annotation	Meaning
H ID	Benefit of Doubt
CON	Contradiction
×	Cross
1242	Error Carried Forward
GM	Odd or incorrect Grammar
~~	Extendable horizontal wavy line
T	Ignore
	Large dot (Key point attempted)
FECO	Benefit of the doubt not given
2025	additional QWC credit given
√	Tick
21	Tick 1
71	Tick 2
~	Omission Mark

Q	uesti	on	Answer	Marks	Guidance
1	(a)	(i)	<u>mitosis</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
		(ii)	<i>idea that:</i> cells, <u>genetic</u> ally identical / have same DNA ;	2	ACCEPT in context of identical to each other or identical to parent ACCEPT 'same genetic information/material'
			so both (daughter) cells receive a full, copy / complement ;		ACCEPT same / correct amount of DNA ACCEPT same / correct number of chromosomes IGNORE ref to clones unqualified IGNORE 'new cells need genetic material' without ref to full amount daughter cells have all the identical genetic material = 2 marks (mp 1 and 2)
	(b)		 1 one maternal and one paternal / AW ; 2 carry same <u>genes</u>; 3 carry, same / different, alleles ; 4 (usually) same / similar, length ; 5 centromere in same position ; 6 same banding pattern ; 7 pair up in meiosis / form bivalent ; 	3 max	CREDIT 'same loci' IGNORE 'genetic material', 'genetically identical' 'genetic information' ACCEPT 'same shape' 'same size' IGNORE 'same pattern'
	(c)	(i)	a, group / collection, of cells ; (cells) specialised / AW ; to perform a function(s) / working together ;	2 max	IGNORE 'same' or 'different' cells ACCEPT same job

Question	Α	nswer	Marks	Guidance
Question (ii)	function acts as a surface or short (diffusion) pathway ; move, mucus / AW or secrete mucus ;	Iocation Iocation Iocation Iocation Iocation Ior	4 4	Guidance Mark the first answer in each box. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks Mark each box independently. IGNORE description e.g. 'one cell thick' ACCEPT glomerulus as blood vessel ACCEPT glomerulus as blood vessel ACCEPT move fluid / liquid for mucus IGNORE removal of germs / dirt / substances / particles ACCEPT 'move ovum' and 'in fallopian tubes' ACCEPT removal of bacteria / fungal spores / dust if in mucus

Q	uesti	on	Answer	Marks	Guidance
2	(a)	(i)	 C (secretory / Golgi) vesicle ; D plasma membrane or cell <u>surface</u> membrane ; E ribosome ; 	3	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 DO NOT CREDIT lysosome ACCEPT cell plasma membrane IGNORE rough endoplasmic reticulum
		(ii)	enzyme / (peptide) hormone / glycoprotein ;	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 named example e.g. insulin, mucus, cytokine, antibodies, collagen IGNORE haemoglobin, histamine, steroid hormones e.g. testosterone
		(iii)	transport vesicles to, plasma / cell surface, membrane ; fusing vesicle to membrane / <u>exo</u> cytosis ;	1 max	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 CREDIT greater detail of cytoskeleton activity e.g. role of protein motors / changing length of microtubules - 'transport' alone not enough IGNORE ref to membrane unqualified ACCEPT binding / merging IGNORE bonding
		(iv)	 receives proteins from the, (R)ER / ribosomes; modify / process, proteins or make glycoproteins / add named molecule(s) / described; (re)package / AW, into vesicles; make lysosomes; 	2 max	IGNORE SER eg add carbohydrate groups / sugars or fold protein modifies and packages proteins into vesicles = 2 marks
			5 replenishes, plasma / cell surface, membrane ;6 lipid synthesis ;		ACCEPT make glycolipids

Q	uesti	on	Answer	Marks	Guidance
	(b)	(i)	nucleus or nuclear, envelope / pore / membrane ; mitochondrion / mitochondria ; (rough / smooth) endoplasmic reticulum / ER OR ribosomes attached to membrane ; Golgi (body / apparatus) ; (secretory) vesicle(s) ;	2 max	Mark the first two answers only. IGNORE membrane bound organelles, lysosomes, free ribosomes, ref to ribosome size
		(ii)			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
			(free / circular / naked) DNA / genetic material / nucleoid ; plasmid ; 18nm / 70S / smaller, ribosomes ;		IGNORE 'chromosomes', 'chromatin' IGNORE mesosome (as this is an infolding of plasma
			Torini / 705 / smaller, hbosomes , Total	10	membrane and not <u>in</u> the cytoplasm)

Q	uesti	on		Answer		Marks	Guidance
3	(a)			open circulatory system	closed circulatory system	1	
			single circulatory system				
			double circulatory system		✓ ;		ACCEPT cross / other mark DO NOT CREDIT if a tick is placed in more than one box
	(b)	(i)				2 max	IGNORE 'the heart' or 'the heart beating' or 'the heart pumping' without further qualification IGNORE ref to right (side) for mp 1 - 3
			systole / contraction	n, increases pressure	;		ACCEPT ref to peak on graph for increasing pressure
			diastole / relaxation	/ blood flowing onwa	rds, decreases pressure ;		ACCEPT ref to trough on graph for decrease in pressure
			(contraction of) vent	tricle, muscle / wall;			ACCEPT ventricular systole
			left (ventricle);				 'contraction of left ventricle' = 1 mark 'contraction of muscle in left ventricle' = 2 marks 'ventricular systole increases pressure' = 2 marks
		(ii)	pulse / heart, rate;			1	IGNORE heart beat / beats per minute

Question	Answer	Marks	Guidance
(c)	marks for pressure change: pressure drops, as distance from heart increases ; greatest / rapid / significant, pressure drop while blood is in the arteries ; pressure, constant / does not drop, in veins ;	3 max	ACCEPT from aorta to arteries / correctly named blood vessels – look for decrease in pressure trend
	marks for amplitude of fluctuations: fluctuation / AW, decreases from aorta to arteries ; no fluctuation in, capillaries / veins ; use of comparative figures with unit ;		ACCEPT plateaus / level IGNORE ref to frequency of fluctuations ACCEPT 'smaller fluctuations in artery' correct figures must be quoted from the graph to back up <u>one</u> point – correct unit used at least once. eg 'peak to peak', between aorta and arteries, falls 18.5 to 14 kPa pressure in aorta between 18.5 and 12.5 kPa pressure in arteries drops from 12.5 to 5 kPa pressure in capillary drops from 5 to 0.5 kPa overall drop from 18.5 to 0.5 kPa Any other figures must be checked against graph ACCEPT correct calculated figure eg pressure drops 6kPa in aorta

Question	Answer	Marks	Guidance
(d) (i)	blood flows into larg <u>er</u> number of vessels ; (total) cross-sectional area of the arter <u>ies</u> is greater than the aorta ; (total) cross-sectional area of the capillar <u>ies</u> is greater than the, aorta / arter <u>ies</u> ;		IGNORE ref to pressure fluctuations and structure of vessel walls as not relevant to overall pressure change ACCEPT idea of vessels branching to many/more (smaller) vessels IGNORE ref to lumen size
	capillary (wall) is, thin / only one cell thick ; (high pressure would) burst / damage, capillary (wall) ; reduce chance of, tissue fluid build up / oedema ;	2 max	IGNORE ref to rate of flow IGNORE ref to capillary walls small / made of squamous cells ACCEPT cannot withstand (high) pressure
	Total	11	

C	Questi	on	Answer	Marks	Guidance
4	(a)	(i)			CREDIT mps 1-3 in context of either blood cell or plant cell Comparative statement must be made.
			1 cell (cytoplasm) has a low <u>er</u> water potential than (distilled) water / ORA ;		1 ACCEPT Ψ ACCEPT more negative water potential
			${\bf 2}$ water moves (into cells) , down water potential ${\bf gradient}$ / from high Ψ to low Ψ ;		2 IGNORE 'along' or 'across' IGNORE definition of osmosis in isolation, must be in context of explaining observations
			3 (water) enters the cell by osmosis ;		3 ACCEPT 'water osmoses into cell' IGNORE ref to diffusion
			4 <i>idea of:</i> cell surface / plasma, membrane (of blood cell) weak so, bursts / cannot withstand pressure / haemolyses ;		
			5 <i>idea of:</i> (plant) cell wall , strong / provides support, so, does not burst / can withstand pressure ;		5 IGNORE ref to rigid wall, wall acts as barrier
			 6 (plant) cell becomes turgid / turgidity increases, which reduces water uptake ; 4 max 		6 IGNORE ref to plasmolysis anywhere in response
			QWC – two technical terms used in context and spelt correctly; 1	5 max	any two from: gradient, water potential, osmosis, cell surface membrane / plasma membrane, turgid / turgidity, (derivatives of) haemolysed (note: only allow turgid for plant cells)

Question	Answer	Marks	Guidance
(ii)	use a, salt / sugar, solution OR add solute to water ;		ACCEPT saline solution
	use a solution with the, same / similar / lower, water potential as blood cells ;	1 max	ACCEPT isotonic / hypertonic ACCEPT same solute concentration / potential IGNORE same water concentration IGNORE use less water / solution with low water potential
(b)	diffusion ;	1	DO NOT CREDIT facilitated diffusion
(c)	1 active, transport / uptake ;		1 ACCEPT facilitated diffusion IGNORE transport using ATP DO NOT CREDIT osmosis
	 <i>plus any two from:</i> 2 cells have, extensions / hairs ; 3 thin cell wall ; 		Allow max two marks for specialised features 2 ACCEPT cells have root hairs IGNORE roots have root hair cells
	 4 large / increased, <u>surface area</u>; 5 many / more, mitochondria; 		4 ACCEPT high, <u>surface area</u> to volume ratio / SA:vol credit in context on root hair cell or root having large surface area
	6 (many) carrier proteins in cell (surface) membrane;	3 max	6 ACCEPT transport proteins / protein pumps ACCEPT channel protein in context of facilitated diffusion
	Total	10	

Q	uesti	on	Answer	Marks	Guidance
5	(a)	(i)	i) <u>tidal volume</u> ;		
		(ii)	being stretched / stretching ;	1	ACCEPT lengthening DO NOT CREDIT relaxing IGNORE expanding 'stretching and contracting' = CON
	(b)		between B & C expiration:	1	
			1 (external) intercostal muscles / diaphragm, relax;		 ACCEPT ref to <u>internal</u> intercostal muscles contracting DO NOT CREDIT ref to diaphragm relaxing and intercostal muscles (unqualified) contracting
			2 rib cage / ribs, move down OR diaphragm, moves / pushed, up ;		2 IGNORE 'diaphragm becomes domed / curved'
			3 volume of, thorax / chest cavity / lungs, drops / decreases ;		3 ACCEPT 'space inside' or 'air in' for volume
			 4 pressure inside, thorax / chest cavity / lungs, increases; 5 above, external / atmospheric, pressure; 6 air leaves down pressure gradient; 7 (elastic) recoil of alveoli; 3 max 		5 ACCEPT (pressure) higher than outside
			QWC – two technical terms used in context and spelt correctly ; 1		Answers given in context of 'at B' or 'at C' – <u>QWC not</u> <u>awarded.</u> Any two from
				4 max	intercostal, diaphragm, recoil, volume thorax, pressure, gradient
	(c)		12 ;;		Allow two marks for correct answer. If answer wrong allow one mark for working <u>60</u> 5
				2	5

Question	Answer	Marks	Guidance
(d)	<i>idea that:</i> thorax / rib cage / lungs, cannot be completely , compressed / flattened ;		
	trachea / bronchi, held open by cartilage;		IGNORE bronchioles or alveoli
	bronchioles / alveoli, held open by elastic fibres ;		IGNORE bronchi or trachea
	AVP;	2 max	eg absence of pressure gradient / atmospheric and thoracic pressures equal presence of surfactant in alveoli upward movement of diaphragm limited by collagen fibres
	Total	10	

Q	Question		Answer	Marks	Guidance
6	(a)	(i)	sucrose and phloem;	1	Both needed for one mark Mark the first answer on each line. 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 sucrase DO NOT CREDIT phloem sieve tubes / companion cells
		(ii)	 hydrogen ions / H⁺ / protons, pumped out of companion cells; increases, hydrogen ion / H⁺ / proton, concentration (gradient) (outside companion cell); hydrogen ions, re-enter / flow back into, companion cells; sucrose / sugar, moves with hydrogen ions / AW; down concentration gradient; ref. cotransporter proteins / cotransport(ation); by facilitated diffusion; sucrose / sugar, diffuses into sieve tube (element); through plasmodesmata; 	3 max	 ACCEPT hydrogen ions leave companion cells using ATP ACCEPT creates gradient DO NOT CREDIT increase, hydrogen ion / H⁺ / proton concentration, in sieve tube element ACCEPT diffuse / move DO NOT CREDIT glucose (penalise once) DO NOT CREDIT sucrose follows H⁺ 8 IGNORE sucrose diffuses into <i>phloem</i>
				3 max	

Question	Answer	Marks	Guidance
(b)	1 active transport requires ATP ;		1 ACCEPT loading / uptake for transport
	 at low temperatures: 2 (molecules have) little kinetic energy; 3 (therefore) less, respiration / ATP made; 4 less active transport or less, movement / loading, of sugars into sieve tube (element); 5 less, osmosis / movement of water, into sieve tube (element); 6 low (hydrostatic) pressure created; as temperature increases: 7 (molecules have) more kinetic energy; 8 (therefore) more, respiration / ATP made; 9 more active transport or more, movement / loading, of sugars into sieve tube (element); 10 more, osmosis / movement of water, into sieve tube (element); 11 higher / more (hydrostatic) pressure created; 		 3 IGNORE no respiration / no ATP made / no loading of sucrose 4 ACCEPT slow active transport / slow loading 9 ACCEPT faster active transport / faster loading
	12 at high temperature (plant), enzymes / proteins, denatured ;	3 max	12 DO NOT CREDIT cells denatured 12 CREDIT change to tertiary structure, damage to proteins
	Total	7	

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