

GCE

Biology

Advanced GCE **2806/01**

Unifying Concepts in Biology

Mark Scheme for June 2010

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Abbreviations, annotations and conventions used in the Mark Scheme	/ = alternative and acceptable answers for the same marking point ; = separates marking points NOT = answers which are not worthy of credit R = reject () = words which are not essential to gain credit <u> </u> = (underlining) key words which must be used to gain credit ecf = error carried forward AW = alternative wording A = accept ora = or reverse argument
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Question	Expected Answers	Marks
1 (a)	fair test / so results, not affected / comparable/ to, control / change only one, variable ; temperature, affects / limits, rate of, reaction / photosynthesis ; enzymes, more active / denature, at high temperatures ; gases / oxygen, (in leaf air spaces) expand(s) as temperature rises ;	2 max
(b) (i)	as distance from lamp decreases discs are quicker to float ; ora figs ; (compare 2 distances and 2 times, with units) inverse square / non-linear relationship ; high(er) <u>light intensity</u> when lamp closer ; ora discs photosynthesise / AW ; produce oxygen ; which, lifts discs / makes them, float / more buoyant ;	4 max
(ii)	variation / ref. anomalies ; detail ; e.g. proportion of, mesophyll / vein tissue / chloroplasts / bubbles discs may shade each other ; prevent bias caused by, disc sticking / being delayed in floating ;	2 max
(c)	no / little, carbon dioxide (dissolved in water) ; limiting photosynthesis ;	2
(d)	light not limiting when distance is small ; ora temperature limiting at high light intensity ; ora enzymes work more slowly at, 5°C / lower temperature ; less CO ₂ present at high T°C also a limiting factor ;	2 max
		[Total: 12]

Question		Expected Answers	Marks
2	(a)	4000 / 544 ; 7 ;	2
	(b)	carrying capacity exceeded ; shortage of / (intraspecific) competition for, food ; disease / parasites ; AVP ; e.g. emigration / cold winters / overcrowding stress reduced breeding / culling (by park wardens) / predators other than wolves	2 max
	(c)	trees / tree canopy, thinned ; more, shrubs / low plants / new vegetation ; more food (accessible) to moose ; ash increases soil fertility ; less competition (for food) from other herbivores ;	2 max
	(d)	increased, transmission / disease spread, at high population density / AW ; greater mortality ;	2
	(e)	moose numbers, kept lower / more stable, after wolves arrive ; rise / fall, in moose numbers followed by, rise / fall, in wolves ; fall / rise, in wolf numbers generally followed by, rise / fall, in moose ; figs in support ; 2 year refs with numbers of moose & wolves in both	2 max
	(f)	(sustained) rise in wolves after, arrival / 1948, although moose numbers low ; wolf population peaks when moose population is falling ; in 1966 wolf population peaked before moose ; figs in support ; 2 year refs with numbers of moose & wolves in both poor correlation between rises and falls in moose & wolf numbers ;	2 max
			[Total: 12]

Question			Expected Answers	Marks
3	(a)		diffusion ; facilitated diffusion ; active, transport / uptake ; co-transport ;	2 max
	(b)		may, inhibit / slow down, enzymes ; by, non-competitive / competitive, inhibition ; by binding to, allosteric / active site ; by altering tertiary structure / blocking active site ; may increase enzyme activity ; by acting as co-factor ; may alter, movement of, ions / molecules, (across cell membranes) ; by binding to membrane proteins ;	2 max
	(c)		positive correlation / as Na^+ increases in solution Na^+ in leaves also increases ;	1
	(d)	(i)	pumping / active transport, uses / wastes, energy / ATP ; which could be used for <u>named</u> function ; R growth R respiration ions continue to enter due to gradient ; pumping out of Na^+ may bring in another ion / AW ;	2 max
		(ii)	idea of, isolation / separation ; enzymes are in the cytoplasm ; ora can't be inhibited ; reactions occur / organelles, in cytoplasm ; ora	2 max
		(iii)	store water ; store (waste) products of metabolism ; A pigments cell turgor / support / AW ; create ψ gradient / symplast pathway ;	1 max
				[Total: 10]

Question			Expected Answers	Marks
4	(a)	(i)	triglyceride ;	
		(ii)	phospholipid ;	2
	(b)		series of (chemical) reactions ; enzymes ; product of first reaction is substrate for the second / AW ; anabolic / synthesis, (pathway) ; catabolic / breakdown, (pathway) ; named e.g. ; A glycolysis / Krebs cycle / Calvin cycle R respiration / photosynthesis alone	3
	(c)		smaller ; 3C instead of 6C / roughly half the size ; fat soluble ; glycerol can pass through phospholipid bilayer directly ;	2

	(d)	1	urea / ethanol / named drug, toxic ;	
		2	concentration needs to be, reduced / controlled, to prevent cell damage ;	
		3	CO ₂ acidic / lactic acid ;	
		4	(altered pH), changes / denatures, (proteins) ;	
		5	e.g. enzymes / membrane proteins ;	
		6	O ₂ needed for respiration / if level falls cells, lack energy / may die ;	
		7	glycerol (used by cells) for respiration ;	
		8	glucose (needed by cells) for respiration ;	
		9	if concentration falls cells, lack energy / may die ;	
		10	if concentration rises excess, wasted / lost, in urine ;	
		11	diabetes / hypoglycaemia / hyperglycaemia / coma ;	
		12	concentration of, water / salts / ions / solutes, affects, ψ / osmosis ;	
		13	if blood plasma, ψ / AW, too low cells dehydrate ;	
		14	if blood plasma, ψ / AW, too high cells, swell / may burst ;	
		15	AVP ; ref. cholesterol levels, plasma proteins,	max 6
			QWC – legible text with accurate spelling, punctuation and grammar ;	1

				[Total:14]
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Question			Expected Answers	Marks
5	(a)	(i)	to fix carbon ; CO ₂ combines with, acceptor / precursor ; to make, organic molecules / sugars / named monosaccharide ; (e.g. glucose / triose phosphate) similar to, photosynthesis / rubisco ;	2 max
		(ii)	disulphide bonds are covalent ; hydrogen bonds weak / S-S bonds strong ; hydrogen bonds break at high temperatures / S-S bonds don't ; (H bond breaking) due to increased molecular, movement / vibration ; ref. denaturing of enzymes ; ref. importance of, tertiary structure / shape of active site of, enzymes ;	4 max
	(b)		no food ; as no light ; no photosynthesis / primary production ; small amount of detritus reaches ocean floor ; temperature, cold / 4°C ;	2 max
	(c)		(sulphide-oxidising) bacteria ;	1
	(d)		(groups of vents), isolated / separated by large distances ; allopatric (speciation) / geographic barrier ; little, movement / migration, of organisms between vents ; little / no, gene flow / interbreeding (between separate populations) ; organisms, evolved in / selected for / adapted to, each place ; novel / different, mutations / alleles, at each site ;	3 max
				[Total: 12]

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