

June 2003

GCE A LEVEL

MARK SCHEME

MAXIMUM MARK: 50

SYLLABUS/COMPONENT: 9700/04

BIOLOGY Paper 4 (Theory 2 (A2 Core))



Page 1		Mark Scheme		Syllabus	Paper
		A/AS LEVEL EXAMINATIONS – JUNE 2	2003	9700	4
1 (a)	top l pacł long	half of leaf/just below (upper) epidermis; ked (densely); axis in line with incident light/AW;			2 max
(b)	cont large chlo shor (cell thin ref. r	ain large numbers of chloroplasts/large amo e vacuole; <i>(only give if linked to next point)</i> roplasts (in cytoplasm) close to cell wall/cell rt diffusion pathway; ) elongated/arranged to intercept (maximum (cell) wall; movement of chloroplasts;	ount of chlo membran ו) light;	orophyll; e;	3 may
					• max
(c)	cont reac mair site site ref.   large prod	ains photosystems/PS1 and PS2/chlorophy ation centres; ntain carriers/receptors in position; of photophosphorylation/light reaction; of ETC; proton pumping/proton gradient; e surface area; duce ATP/ref. ATP synthase; duce reduced NADP;	II and acce	essory pigm	ents/ 4 max
(d)	ref. 1 carb drive and form	to Rubisco; oon dioxide combines with RuBP; en/powered by ATP; reduced NADP; is PGA;		T	2 max <sup>-</sup> otal: 11
2 (a)	prov suita e.g. activ	rides energy; able examples; <i>muscle contraction, protein synthesis, DNA</i> /e transport	replication	n, cell movel	ment, 3
(b)	subs oxid	strate level phosphorylation cytoplasm matrix of m lative phosphorylation inner mem	(in glycoly nitochondri brane of m	sis); a (in Krebs iitochondria	cycle); /cristae;
					2 max
(c)	oxid ref. 1	ative phosphorylation more than substrate le to quantity, e.g. 32/34 vs. 4/6 per glucose;	evel phosp	horylation;	

Page 2		Mark Scheme		Paper
		A/AS LEVEL EXAMINATIONS – JUNE 2003	9700	4
(d)	req wit NA oxy	juires proton gradient produced by ETC; h no oxygen ETC does not occur/no electron flow; D cannot be reformed/NADH cannot be oxidised; /gen combines with electron/proton/oxygen final accepte	or in ETC;	3 max
3 (a)	A B C D E	vesicles containing transmitter/acetylcholine/synap presynaptic membrane; synaptic cleft/gap; post synaptic membrane; receptor/protein/Na <sup>+</sup> gate;	tic vesicle;	5
(b)	arr	ow pointing down;		
				1
(c)	ref. low Ca <sup>2+</sup> in synaptic knob/high Ca <sup>2+</sup> outside knob; action potential/depolarization causes opening of Ca <sup>2+</sup> channels; Ca <sup>2+</sup> into synaptic knob; causes vesicles to move towards presynaptic membrane; causes vesicles to fuse with presynaptic membrane; vesicle contents/transmitter/executors into synaptic cleft/gap;			
	VCC		ap,	3 max
				Total: 9
4 (a)	me II; (	taphase; (allow one mark for telophase and two marks for telopha	ase 1)	2
(b)	ref. cer cho to o chr nuo ref.	spindles/microtubules shorten contract/pull/breakdown ntromeres divide; promatids (pulled) apart; ppposite poles; romosomes unwind/AW; clear membrane reforms; ccytokinesis/cleavage;	• •	4 max
(c)	ind	ependent/random assortment:		
(0)	of I diff cro bet	nomologous chromosomes; erent combinations of parental chromosomes; ssing over/chiasmata; ween chromatids of homologous chromosomes/non-sis	ter chromat	ids;
	breaks up linkage groups/mixes alleles from parents; <b>R</b> genes ref. to non-identical/genetically different gametes;		nes	-
				4 max

Total: 10

Page 3		Mark Scheme	Syllabus	Paper
		A/AS LEVEL EXAMINATIONS – JUNE 2003	9700	4
5 (a)	phe res env gei gei	enotype is the feature/characteristic; sults from interaction of genotype and environment on or vironment may alter the appearance of an organism; notype unaffected by environment; netic characteristics inherited/passed on to offspring/ora ssessed;	rganism/ /represents	alleles 2 max
(b)	arti cho nat ref. ref.	ificial selection carried out by humans; cose organisms with useful characteristics/benefit to hur tural selection carried out by environment; . survival (to breed); . evolution;	nans;	
				3 max
(c) (i	) len coo	gth of DNA/sequence of bases/locus on a chromosome ding for a characteristic/protein/polypeptide/enzyme;	,	2
(ii	) alte det occ ref. ref.	ernative form of a gene; termining contrasting characters/controls one form of a c cupies same locus; . sequence of bases; . dominance:	character;	
		· · · · · · · · · · · · · · · · · · ·		3 max
			Т	otal: 10