

CAMBRIDGE INTERNATIONAL EXAMINATIONS GCE Advanced Subsidiary Level and GCE Advanced Level

## MARK SCHEME for the May/June 2014 series

## 9700 BIOLOGY

9700/43

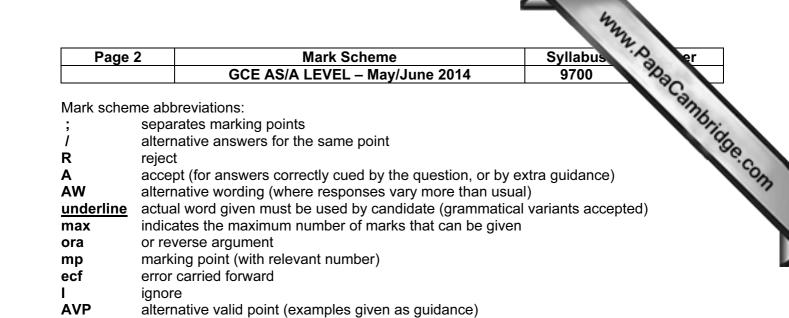
Paper 4 (A2 Structured Questions), maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

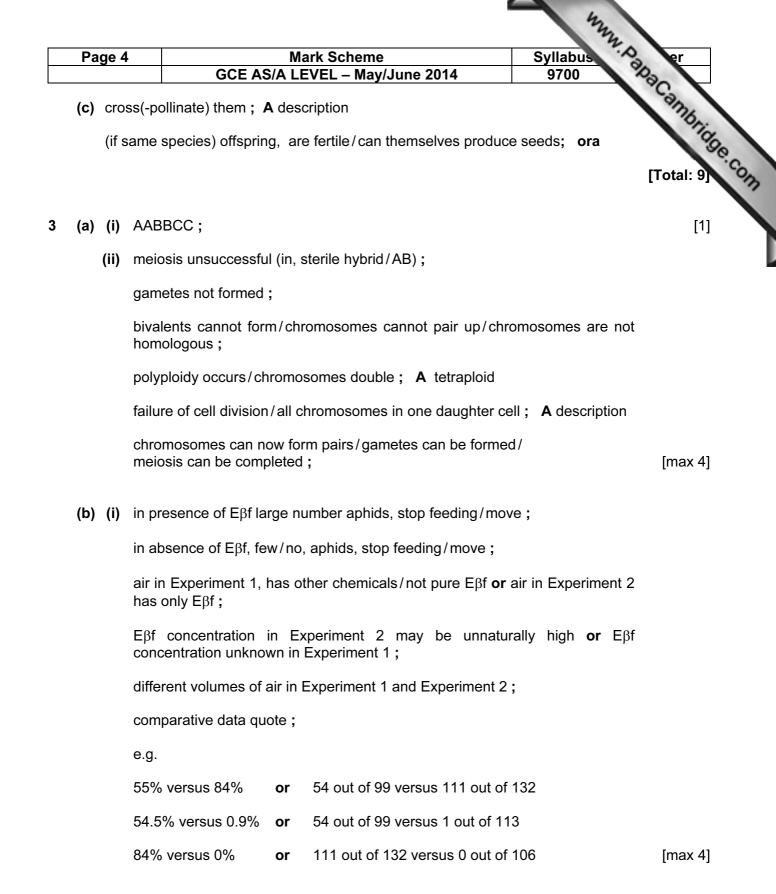
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.



Page 3	Mark Scheme Syllabus	or
raye J	GCE AS/A LEVEL – May/June 2014 9700	apa .
(a) (i)	stroma;	amp
(ii)	low <u>er</u> CO <sub>2</sub> <u>concentration</u> ;	er anaCannbride
	less, carbon fixation/CO $_2$ combining with RuBP/RuBP converted to GP ;	
	RuBP reformed from TP ;	[max 2]
(iii)	0.01 ;;	
	<b>A</b> 0.012 <b>or</b> 1.8 ÷ 150 <b>or</b> $\frac{2.0 - 0.2}{150}$ <b>or</b> $\frac{2.0 - 0.2}{350 - 200}$ for 1 mark	[2]
(b) less	STP;	
•	less) conversion to, (other) carbohydrates/lipids/amino acids/proteins ; amed examples, e.g. glucose/hexose/cellulose/starch	
AVF	F ; e.g. 1 – (amino acids) used to make proteins for, growth/cel division	I
	division e.g. 2 – (carbohydrate/lipid) for respiration for, growth/cell division	[max 2]
		[Total: 7]
<b>(a)</b> idea	a of cross-pollination involves two (parents)/self-pollination one (parent);	
ref.	outbreeding/inbreeding;	
(two	o parents) have different, genotypes/sets of <u>alleles</u> ;	
idea	a of new combinations of <u>alleles</u> in offspring;	[max 3]
<b>(b)</b> (tota	al) DNA/genome, cut into fragments ;	
by r	estriction enzymes ;	
DN	A, denatured/made single stranded;	
ref.	primers/(modified) PCR ;	
ref.	dideoxynucleotides/chain termination;	
DN	A/Taq, polymerase ;	
сор	ies of different lengths produced ;	
elec	ctrophoresis; A description	
dete	ection, of fluorescence / by laser scanner;	
	uence of, bases/nucleotides, read (by computer);	[max 4]



Page 5	5 Mark Scheme GCE AS/A LEVEL – May/June 2014	Syllabus of er 9700
(ii)	Eβf stops aphids settling ;	Syllabus 9700 Brocenhbrid
	E $\beta$ f attracts, predators of aphids/ladybirds ;	STE
	attacked aphids secrete more $E\betaf$ ;	
	aphids not, eating/taking nutrients from, wheat;	[max 3]
(iii)	gene/E $\beta$ f, already in, peppermint/various plant species ;	
	$E\betaf$ not, toxic/harmful to human health ;	
	no new chemical added to human diet;	
	does not kill insects (unlike Bt maize or cotton);	
	aphids still available for, predators/food web;	[max 3]
		[Total: 15]
(a) (i)	spermatagonium – 2n primary spermatocyte – 2n secondary spermatocyte – n spermatids – n spermatozoan – n ;;	
	all five correct for two marks three or four correct for one mark	[2]
(ii)	(spermatogonium to primary spermatocyte) growth / mitosis	;
	(spermatid to sperm) maturation ;	[2]
(iii)	any 1 from	
	provide nutrients for sperm(atid);	
	protect sperm from attack from immune system;	
	regulation of, sperm production/FSH;	
	AVP ; e.g. removes excess cytoplasm during sperm matura guides sperm to centre of tubule	ition/ [max 1

Pa	ge 6	6 Mark Scheme Syllabus	· Age er
		GCE AS/A LEVEL – May/June 2014 9700	Pac
(b)	FSł	Н;	SIMB,
	(ho	rmone) given to stimulate <u>follicle</u> development ;	1
	Gnl	RH agonists/GnRH receptor antagonists;	W. Papacambru
	to p	prevent, LH surge/ovulation;	
	hun	man chorionic gonadotrophin ;	
	(ho	ormone) given to stimulate maturation of oocytes;	
	(ma	ature oocytes) collected from ovaries (just before ovulation);	
	ref.	use of, fine tube/needle/ultrasound;	[max 4]
(c)	(i)	FSH (alone)/FSH + testosterone, increases development (of sperma into, spermatozoa/elongated cells);	atids
		testosterone (alone) has very little effect ;	
		FSH + testosterone causes great <u>est</u> increase of development ;	
		use of, comparative/manipulated, figures;	[4]
	(ii)	(reduction is very small so) may be, insignificant/random/due to chance	;
		(some cells) may have died ;	[max 1]
(	(iii)	temperature, similar to testes/in range 30 °C to 35 °C/lower than core ;	
		spermatozoa production, will not proceed at 37 °C/at high temperature ;	[2]
			[Total: 16]
(a)	ran	idom/spontaneous;	
	mut	itation;	
	bas	se/nucleotide/triplet, change/substitution; <b>R</b> addition/deletion	[max 2]
(b)	(i)	as altitude increases frequency of <b>A</b> <sup>0</sup> increases ; <b>ora</b> for <b>A</b> <sup>1</sup>	
. ,	. /	A <sup>0</sup> more frequent at high altitudes / A <sup>1</sup> more frequent at low altitudes /	

Page	e 7	Mark Scheme Syllabu	· A er	
		GCE AS/A LEVEL – May/June 2014 9700	Pac	
(i	i) idea	of (pre-existing) genetic variation in deer mouse population ;	elective	
	at high altitude mice with, glycine/ <b>A</b> <sup>0</sup> , more likely to survive/have selective advantage <b>; ora</b>			
	mice	e (with <b>A<sup>0</sup></b> ) reproduce (at high altitude) <b>; ora</b>		
	and	pass on the <b>A<sup>0</sup></b> allele ; <b>ora</b>		
	parti	ial pressure/concentration, of $O_2$ acts as a selection pressure ;		
	ref.	to disadvantage of haemoglobin with very high affinity at low altitud	de;	
	as le	ess able to unload oxygen (in respiring tissues) ;	[max 4]	
			[Total:8]	
(2)	hannole	s; I voltage-gated		
		sed; A positive inside		
r	eceptor	/generator;		
tl	nreshold	d ;		
fı	requenc	cy; A number per second/rate R speed	[5]	
<b>(b)</b> a	ction po	otential stimulates neighbouring area of membrane ; AW		
Ν	la⁺, mov	ves sideways/attracted to areas at resting potential;A local circu	it	
С	auses,	Na⁺ ion channels to open/2 <sup>nd</sup> depolarisation ;		
(1	transmi	ssion) in one direction due to, hyperpolarisation/refractory period ;	;	
n	nyelin sl	heath/Schwann cell ;		
s	heath ir	nsulates, axon/dendron/neurone;		
d	epolaris	sation/action potential, only at nodes of Ranvier/unmyelinated par	rt ; <b>ora</b>	
s	altatory	conduction/action potential 'jumps' from node to node;	[max 5]	

Page 8	Mark Scheme	Syllabus er
	GCE AS/A LEVEL – May/June 2014	9700 23
(a) <u>centrom</u>	<u>ere</u> ;	amphi
(b) idea tha	<i>t</i> different <u>genes</u> , are present/missing <b>; R</b> alleles	Syllabus 9700 Bracambridge. [2]
different	, proteins/poypeptides, produced/missing;	[2]
(c) XY ;		
x x	1 X Y;	
XX	XX <sub>1</sub> ;	
normal	Turner's ;	[4]
		[Total:7]

8 (a) (DNA for) transcription / codes for mRNA ;

(ribosomes for) translation;

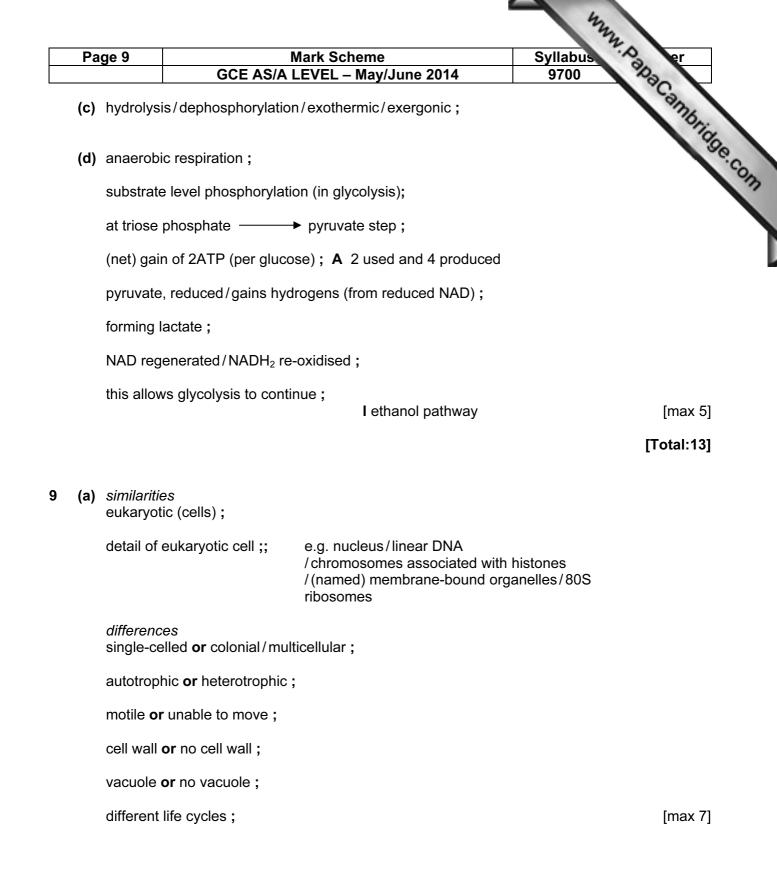
synthesis of, respiratory enzymes/named enzyme/inner membrane proteins; [max 3]

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(	h١	
L	~,	

correct order	letter of stage
1	V
2	S
3	U
4	w
5	R
6	Q
7	x
8	Т

S U W all above R ; S U W in correct order ;

Q X T all below R ; Q X T in correct order ;



Page 10	Mark Scheme	Syllabus er
	GCE AS/A LEVEL – May/June 2014	9700 23
(b) fall in nur	nbers ;	/red list ;
danger of	f becoming extinct ;	1930
ref. (IUCN	N/International Union for Conservation of Nature)/	/red list ;
example	k for idea, additional mark if qualified with po	int specific to named
<i>e.g.</i> habitat de detail <b>;</b>	estruction;	
climate cl detail; e	hange ; .g. rise in temperature	
increase detail ;	in disease ;	
increase detail ;	in, predators/grazers ;	
decrease detail ;	in food ;	
named po detail ;	ollutant and habitat affected ;	
	killing/poaching/removal (plant) ; g. trade in animal parts, selling rare plants	
increased detail ;	d competition ;	
lack of hu detail ;	uman education ;	
disturban detail ;	ce to breeding sites ;	[max 8]
		[

Paç	ge 11	Mark Scheme GCE AS/A LEVEL – May/June 2014	Syllabus 9700	er
0 (a)	hacteria	walls made of peptidoglycans ;	Syllabus 9700 Pho	Can
0 (4)		secrete autolysins ;		"bric
		les in cell wall/ <b>AW</b> ;		
		wall to stretch during growth / <b>AW</b> ;		
		otein) peptidases form cross-links (between peptidogly	cans);	
		n) inhibits (glycoprotein) peptidases ;		
		ks (between peptidoglycans) do not form ;		
	cell wall	weakened ;		
	bacteria	take in water by osmosis ;		
	increase	d turgor pressure causes cell to burst ; AW		
	AVP; e.	.g. competitive inhibition		[max 8]
(1-)	nof biolo			
(D)	ref. biole	-		
	_	bacillus/ <u>A</u> . ferrooxidans ; <b>A</b> <u>T</u> hiobacillus/ <u>T</u> . ferrooxida	INS	
	U	e ores/(mine) waste; tals ; e.g. copper, zinc, cobalt, uranium, lead, n	siskal and silver	
	l iron	als; e.g. copper, zinc, cobait, uranium, ieau, r	lickei, yoiu, siivei	
	insoluble	e ore turned into soluble products ;		
	ore piled	up;		
	acidic co	nditions created/pH low(ered)/pH 1.5 – 3 ;		
	different	bacteria at different temperatures ;		
	chemoau	utotrophic ; A description		
	oxidation	n (reactions) ;		
	sulfide/S	S $^{2-}$ to sulfate/SO <sub>4</sub> $^{2-}$ ; (direct oxidation of ore)		
		rous $\rightarrow$ Fe <sup>3+</sup> /ferric;		
	Fe <sup>3+</sup> oxio	dise other ores ;		
	product,	drains/leaches/is washed, into pool;		
	metal dis	splaced by adding scrap iron ;		[max 7

[Total:15]